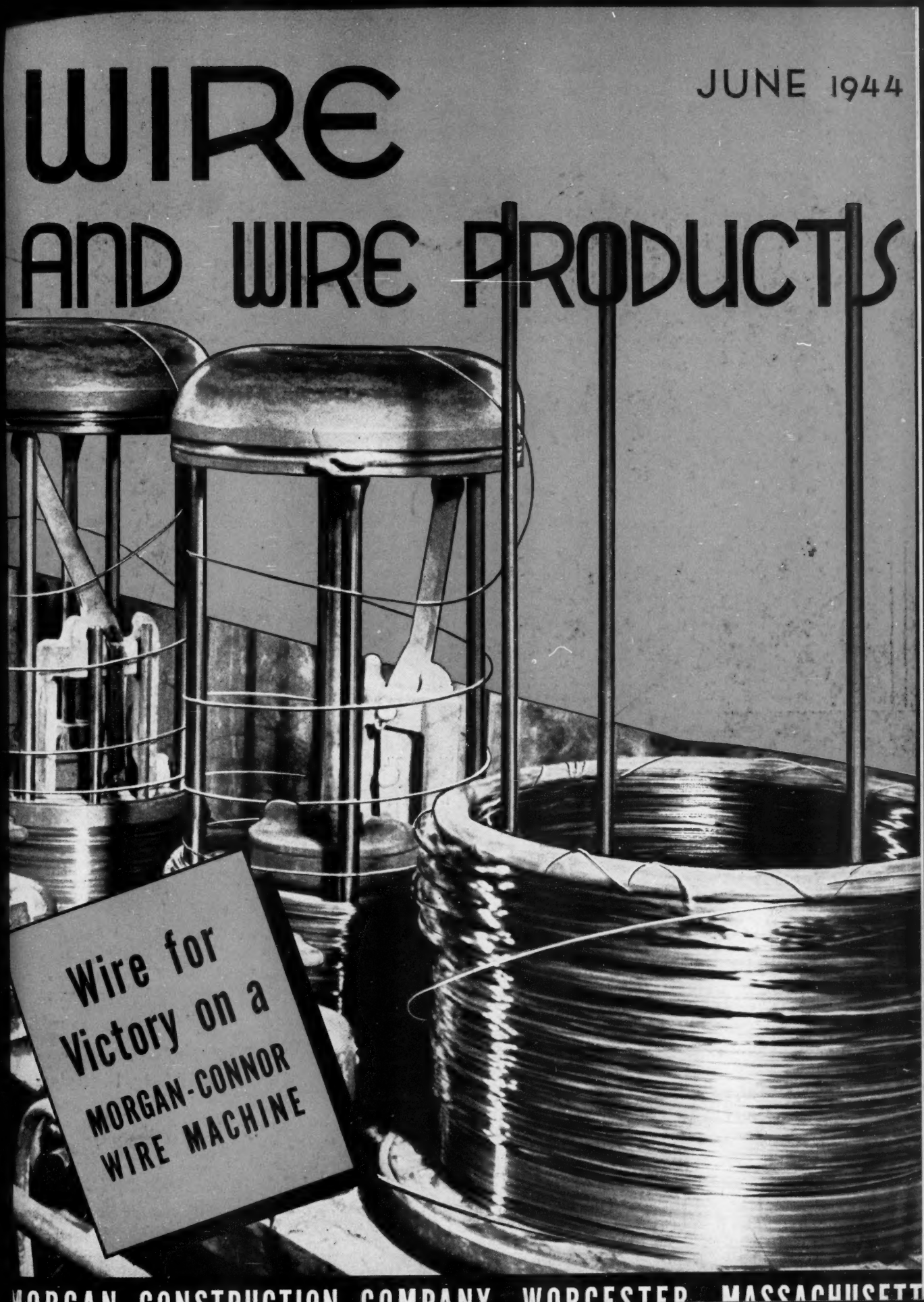
WIRE AND WIRE PRODUCTS

JUNE 1944



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. . . Another Norton Abrasive to Help You Meet Your Grinding Jobs More Exactly.

Never — in Norton Company's over a half century of experience in developing new abrasive products, have field tests of a new grinding wheel been more successful than those of 57 Alundum wheels.

This new Norton abrasive was developed several years ago but limited production facilities restricted its use to critical war jobs. Now it is available for general use and your Norton abrasive engineer will be glad to study your grinding jobs and tell you just where 57 Alundum wheels can be of help to you.

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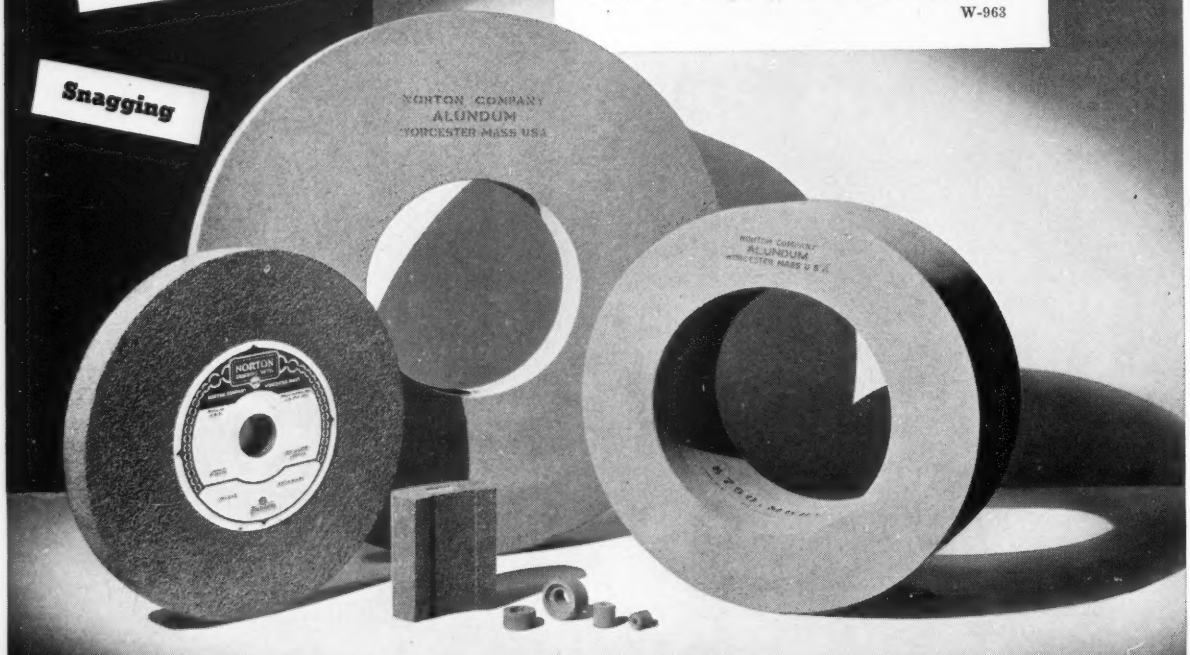
W-963



NORTON ABRASIVES

Slide Fasteners made of Bethanized Wire

On Navy flat-tops and at Army air bases when the loudspeaker announces the approach of enemy planes, American fighter pilots speedily don boots and flying-suits equipped with slide fasteners, and sprint to waiting Corsairs and Thunderbolts.

Time-saving, sure-acting slide fasteners for fliers' outer equipment, and countless other war uses, are today being made of bethanized wire. The adaptability of bethanized wire for this use is further proof of the remarkable way in which the bethanized coating stands up under severe fabrication.

By the bethanizing process, a zinc coating 99.9+ per cent pure is deposited on the wire electrolytically. This coating is so ductile that it will not peel, crack or chip under practically any fabricating operation that the wire itself will stand. Because the coating is so evenly applied both along and around the wire, there are no thin spots to give rust a start. In most instances the zinc coating will outlast the slide fastener.

Bethanized wire is doing many other diversified war jobs... armoring under-water cables... providing extra strength for field telephone wire . . . forming long, pliant handles for brushes to clean guns. It's now being assigned to other applications, some of which were never before thought possible for zinc-coated wire. Post-war uses of bethanized wire may far exceed all previous ideas of the field of application of zinc-coated wire.

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

Bethlehem Steel Export Corporation, New York City

No aspirin comes with this steel wire . . .

● Possibly you are planning the manufacture of a peacetime product which calls for a new application of wire. If so, it may be highly desirable to have our metallurgical engineers review your blueprints and specifications now.

By knowing all the conditions of use, the amount of forming or processing to which the wire must be subjected, and its ultimate service requirements, our researchers can develop the proper type of wire to meet your needs. On these factors depend the carbon content, annealing, cleaning, finishing procedures . . . and the laboratory control tests established to make sure all usual headaches are banished in advance from *that* part of your product.

At Wickwire Spencer careful control has become a 123 year old habit. From ore to finished product, every step in the manufacture of our wire is done in our own blast furnaces, open hearths and modern wire mills. This is your assurance that when you specify WISSCO wire you'll get the grade that's best for the purpose intended. Let us help you find the answer to your wire needs.

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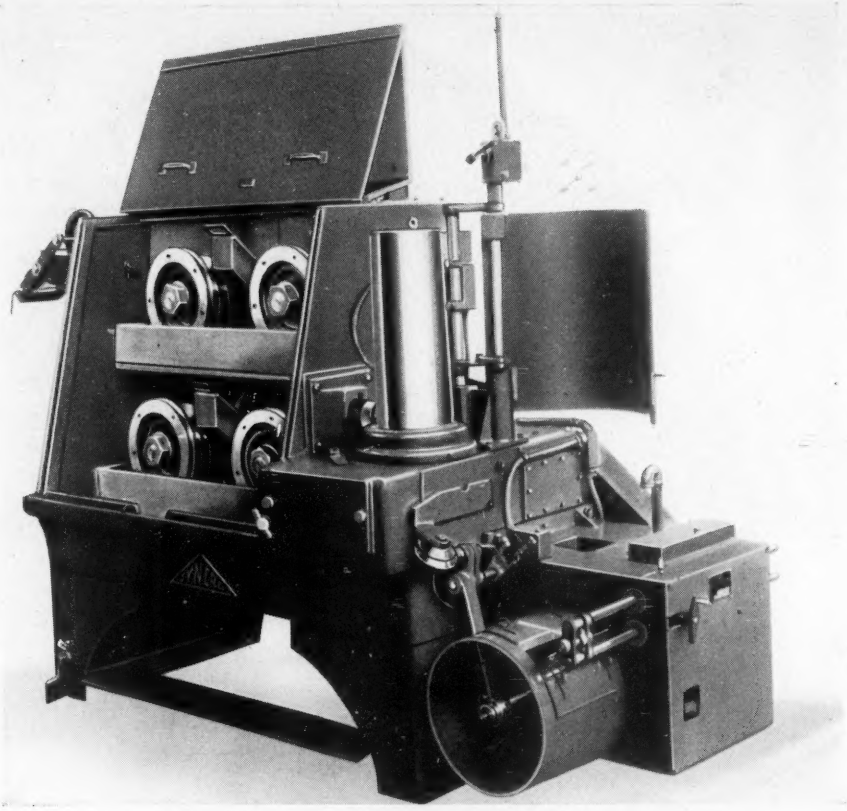

Continuous *wet* drawing of low and high carbon *steel* wire with the SYNCRO BCS-14 machine

Equipped with 14 dies and 4 draw block shafts, the Syncro BCS-14 Machine wet draws low and high carbon steel wire at high speeds. The maximum entering size for this machine is #13 W & M gauge.

Extremely flexible, this machine is equipped with a coiler and a spooler, and the changeover from one to the other is easily and quickly effected.

The coiler block can be arranged to produce either right or left hand winding. The unusual height of the block permits production of heavier coils, which reduces shut-downs and operator attention.

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Similar equipment is available for all non-ferrous metals.

The Syncro BCS-14 Machine offers you many advantages. Write for complete details.

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Machinery for the Wire Industry

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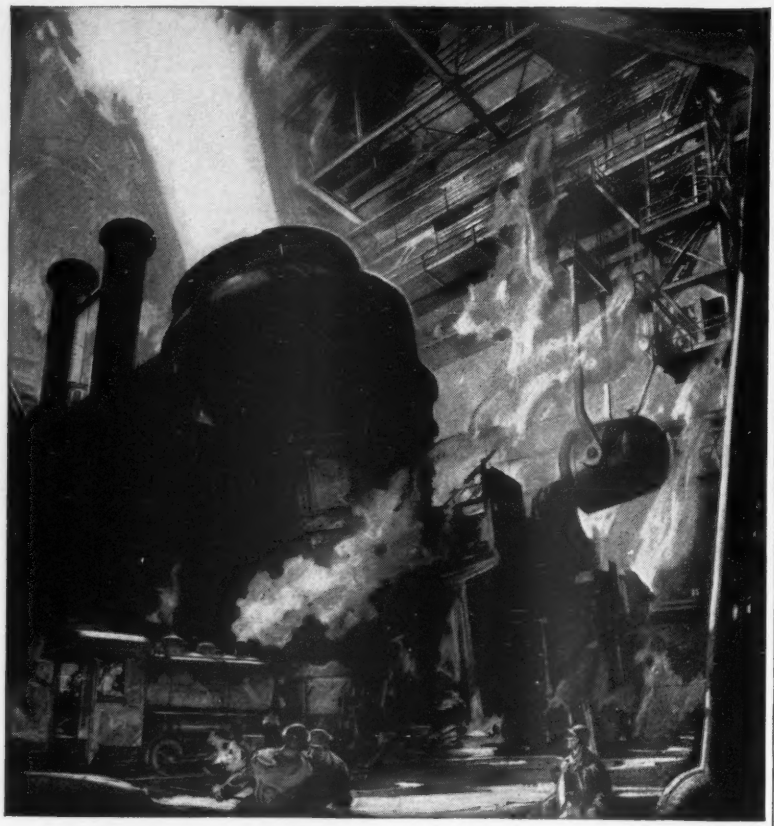

FLAME THROWERS OF THE STEEL FRONT

Bessemer converters are the flame throwers of production on the steel front. They spear the skies over the busy steel plants of America with fiery warnings to our enemies.

The Bessemer process first made steel available in commercial quantities. In recent years progress in the operation of converters has been outstanding, with "flame control" — a product of J&L research — the first major scientific contribution to uniformity of quality.

Easy to work and machine, this new steel now supplying urgent war needs, promises abundant contribution to better living in peace time.

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J&L STEEL

CONTROLLED QUALITY STEEL FOR WAR

THE BESSEMERS

"Blow air through molten iron and expect to improve its quality? or make steel? Ridiculous idea!" exclaimed British iron workers back in the 50's when an Englishman first proposed it. "A crazy notion! It will just cool the iron!" scoffed iron workers in this country when an American began toying with the same idea at about the same time. But the inventors persisted with their experiments in oxidation of molten metal and secured such results that the world experienced an industrial evolution which gave it the superior metal, steel, in commercial quantities, at prices that enabled its wide application in commerce, construction and transportation. (In the 50's steel was made in small lots, sold for $250 to $300 a ton).

42-year-old Henry Bessemer, prolific British inventor, not then a steel man, conceived the converter for transforming iron into steel by blowing air through the molten metal, and patented it in 1855. (He formed own steel company in 1858). Bessemer was knighted at 66, not for inventing steel converter, but for suggestion he made when only 20 years old for an improvement preventing re-use and counterfeiting of seals and stamps on official documents.

"Kelly's air boiling process" was the name William Kelly, an ironmaster of Eddyville, Ky. and a native of Pittsburgh, gave to his experiments in a crude little brick furnace pot in which, a few years before Bessemer's invention, he explored his "crazy notion." Kelly's converter, by his own admission, never "converted," i.e. changed iron into steel, but did yield a more highly refined iron.

Bessemers are spectacular, especially at night, as their pulsating flames and sparks fan high in the heavens, constantly changing colors from ruddy red through burnt orange and pale yellow to blinding white. Converters situated on banks of rivers or lakes put on a show that is doubly thrilling by reflection of the fiery scene upon the black night waters. Travelers to Pittsburgh often watch the stirring technicolor picture of the Bessemers at work for Victory in the big J&L Pittsburgh Works along the Monongahela River, and gaze fascinated at the fiery scene when passing the great 4-mile long J&L Aliquippa Works on the Ohio River.

25 tons of steel every 15 minutes are made in the big pear-shaped Bessemer vessels. Demands for war steel keep the Bessemers of America working night and day, seven days a week, month in, month out.

The unwinking eye of the Bessemer flame control device, an invention of Jones & Laughlin (patented in 1940), is the first basic improvement made in the process since Sir Henry's day. It is an arrangement of photo-electric cells, filters and relays which indicates the precise moment the analysis of the steel is right.

Cuprodine

A UNIQUE METALLIC LUBRICANT

CUPRODINE is a powdered chemical which, when dissolved in a dilute sulfuric acid, produces adherent, bright copper coatings on steel surfaces by simple immersion without the use of current.

Cuprodizing wire and other steel surfaces to be drawn facilitates and improves drawing, reduces metal pickup, increases production, prolongs die life and minimizes scratching and breakage.

A polished steel surface when magnified appears rough — covered with pin points and file-like ridges.

In drawing with usual lubricants, depending upon soap, lime, grease, etc. for their effectiveness the microscopic sharp edges and points push through the lubricating film. Some of them, due to their minute size, are heated sufficiently to weld to the die with the result that either the die or the work tears out.

Cuprodine does not lubricate in the ordinary sense of the word. Its unusual effectiveness is due not only to the copper coating it forms on the metal but largely to the removal of the microscopic ridges and points. These are selectively dissolved by the acid of the Cuprodine bath, causing the copper to plate out of the solution in a thin, tight coating on the work.

The sharp points and ridges, responsible for failure with ordinary lubricants, are gone. The relatively smooth surface is coated with an even coating of soft copper.

Cuprodized surfaces may be made more rust resistant if treated with Cuprotek.

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AMERICAN CHEMICAL PAINT CO.

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Note: West Coast Plants may address inquiries and orders for prompt delivery to: Leon Finch, Ltd., 728 East 59th St., Los Angeles, Calif.

American Chemical Paint Company, Ambler, Pa.

Please send me general Technical Service Data Sheets on

☐ Cuprodine ☐ Cuprotek

*Name*_____ *Title*_____

*Company*_____

*Address*_____

D-6

CHEMICALS ACP PROCESSES

1944 Convention To Be Held At PITTSBURGH!!

The 1944 Annual Convention of the Wire Association will be held at Pittsburgh, Pa., October 16th-19th inclusive—with headquarters at the William Penn Hotel—instead of being at Cleveland, Ohio, as originally planned.

The mail vote of our membership taken some time ago was 85% in favor of this change and the subsequent unwillingness of the hotel at Cleveland to even approximately meet our room requirements made the change imperative.

The date—October 16th-19th inclusive — coincides with the meeting of the American Society for Metals at Cleveland, and our program is so arranged that Wire Association members who so desire, will be able to have at least two days available for attendance at that meeting.

ALL HOTELS ARE CROWDED TODAY—SO - - -

It is essential to you, as well as to the hotel, and the Wire Association, that you make your reservations for Pittsburgh as soon as possible—

— SEND THEM IN NOW IF YOU CAN ! ! —

Reservations **must** specify date of arrival and departure—

Reservations must be made to **this** office in order to receive confirmation.

Reservations must **not** be made to the hotel.

— They will be honored in the order of their receipt —

FOR ADDITIONAL INFORMATION ADDRESS

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

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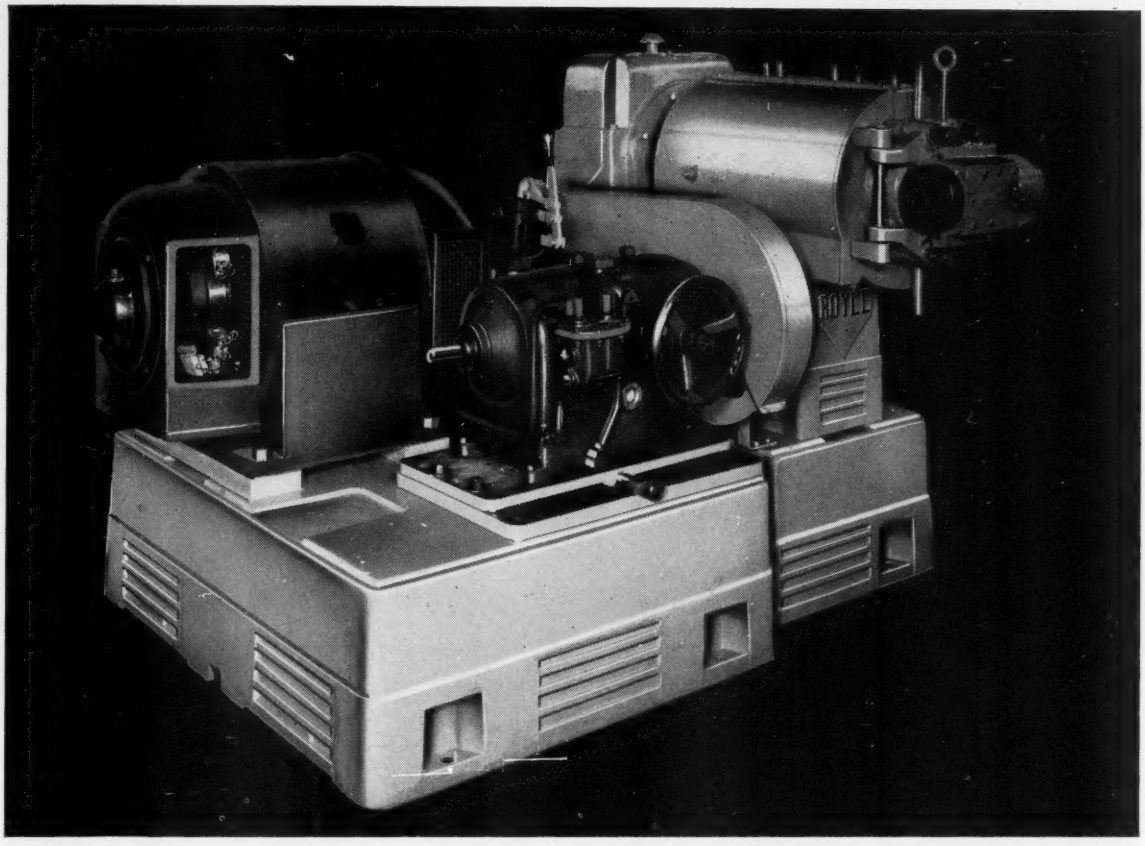

64 Years of Progressive Pioneering . . .

A lot of water has flowed over the dam since the first Royle Extruder was introduced sixty-four years ago. In 1880—and during the following decade—an impenetrable veil of secrecy existed. No extruder had ever been seen in operation nor had any report on production achievements ever been received.

That veil of secrecy is gone. In its place has come a spirit of wholesome cooperation. This cooperative spirit makes it possible to design Royle Extrusion Machines to meet the specific requirements of the application involved. As always cooperation produces maximum results.

Today, Royle production is devoted to the requirements of the Armed Forces. New applications of extrusion processes are being developed. These new processes hold promise of new and better products when Victory has been won.

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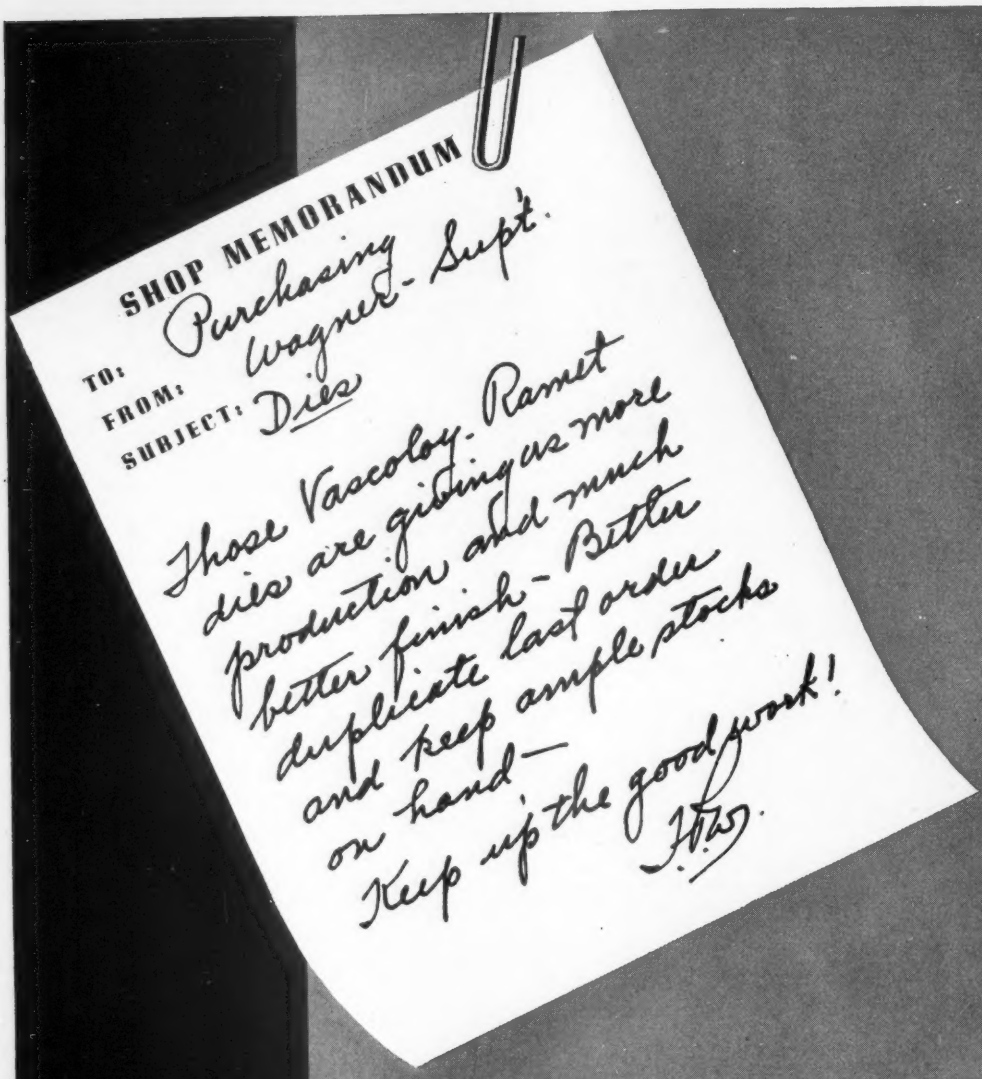
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FROM: Wagner - Supt.
SUBJECT: Dies
Those Vascoloy-Ramet dies are giving us more production and much better finish - Better duplicate last order and keep ample stocks on hand—
Keep up the good work!
J.W.S.

TANTALUM-TUNGSTEN CARBIDE DIES produce more tonnage with better finish. Time spent in shut-downs for die changes, and for polishing and re-cutting dies—all affect production. Tantalum-Carbide has a definite lubricating action—it reduces the tendency of the wire or rod to gall and seize as it passes through the die. Result: A smoother finish free from score marks!

Makers of
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CARBIDE TOOLS &
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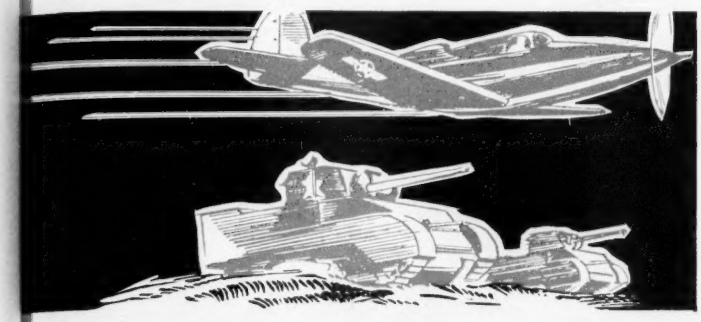
Speed .... Safety .... Stamina



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WIRE PRODUCTION

Plus

Flexibility and Versatility

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Vaughn

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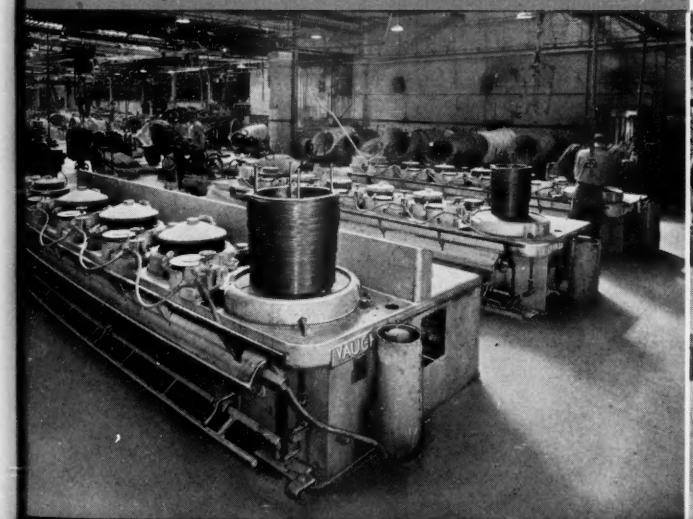
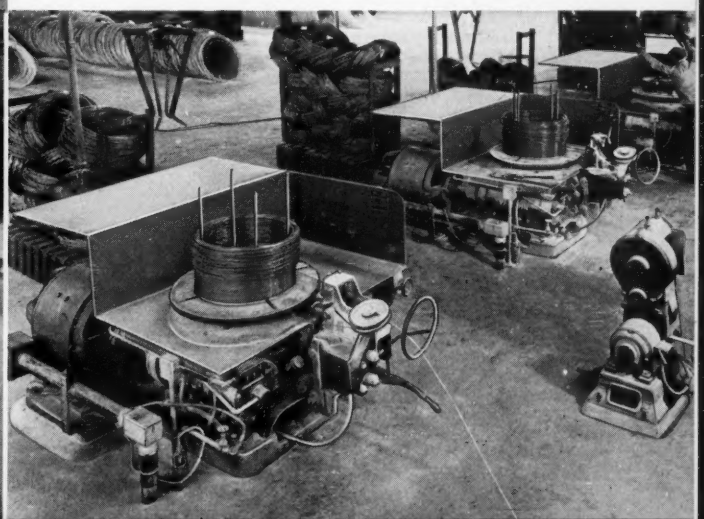
Peacetime thinking and planning are naturally important considerations to management at the present time. VAUGHN equipment not only fits into the heavy production requirements today but is inherently adaptable for peacetime conditions and the change of products which is inevitable. Remember, it is the product that will require change,—*not the equipment.*





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Continuous or Single Hole ... for the Largest Bars and Tubes ... for the Smallest Wire ... Ferrous, Non-Ferrous Materials or their Alloys.

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Wire Drawing Machines

FOUNDED WATERBURY FARREL 1851

These high speed machines are available in several sizes and can be had with either a coiling block or spooler. The spooler may be an attachment or a separate floor-type device, such as shown. This is the No. 4 machine with belt-type cradle spooler. It is driven by a direct-coupled motor (not shown), has 13 dies and capacity for drawing copper from ¼" maximum starting size down to a finishing size of from No. 10 to No. 18 B. & S. gage. The dies and the hardened steel drawing rolls are enclosed by a rolling steel curtain to confine the splash of the drawing lubricant.

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FOUNDRY & MACHINE COMPANY
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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 19 JUNE, 1944 No. 6

Designated as

Official Publication By The Wire Association

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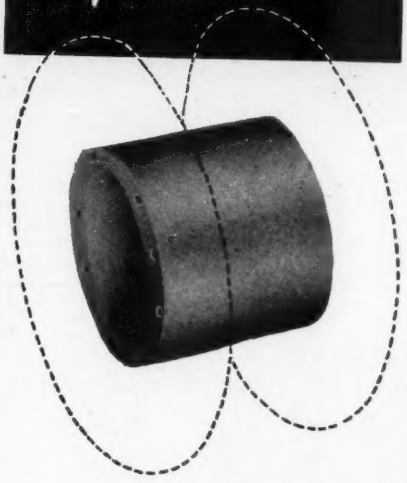
7 Cost Reducing Features in Stevens Flanged Steel Traverse



(1) Reduces reel assembly costs by eliminating the labor of handling a large number of small parts.

(2) Makes a stronger reel.

(3) Increases number of trips per reel from 50% to 100% before cut downs or complete scrapping of wooden reel heads.

(4) Traverse can be used over and over.

(5) Reduces maintenance cost.

(6) Reduces potential hazard of damage to wire and cable in transit and in the field.

(7) As much as sixteen years' service without refinishing or major maintenance.

These statements are taken from actual experience records.

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SPRINGS HAVE PERFECT FINISH

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To meet the increasing demands for FIRTHALOY, we are carrying larger stocks of "milled-and-brazed" tools for immediate shipment. Service engineers are also prepared to train tool-room personnel in the finishing of these partially finished tools.

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WIRE AND WIRE PRODUCTS

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Wire Products and Insulated Wire and Cable.
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Vol. 19 JUNE, 1944 No. 6

Copper in Galvanizing Zincs and Galvanizing Baths

By Wallace G. Imhoff,
President of The Wallace G. Imhoff Co.,
Vineland, New Jersey.

General Statement

"THE Effect of Copper on Hot-Dip Zinc Coatings" was the subject of an article published by Wire and Wire Products in Vol. 17, No. 8, August 1942. It was stated in that article by the writer that from many years of actual contact with the galvanizing industry it was believed that a small amount of copper, not above 0.25 of 1 per cent, was not only not harmful to hot-dip zinc coatings, but actually beneficial. There are many practical things that we feel are true that are extremely difficult to prove are true. As a typical example of this line of thought, the writer also believes for certain types of zinc coatings, namely, metalware articles, that very small amounts of both cadmium and antimony are very beneficial, and yet this is contrary to the usual argument that a pure zinc is to be desired rather than one containing impurities. So in the light of this statement it is of practical interest to see how and why, a different line of thought runs contrary to what might be termed the standard practice, or beliefs.

✦ ✦ ✦

Practical Results Are Beneficial

BY logic we arrive at the statement that most galvanized water pails when they are thrown away, have a perfect zinc coating still on them, and that they are discarded because they are bent or broken, or perhaps have a hole in them. It is very seldom if ever that they are discarded because of failure of the zinc coating, and this seems to be true regardless of the kind of zinc used, and the composition of the galvanizing bath. It is not a new thing to add a small amount of antimony to the galvanizing bath as an alloy addition because this has been done for over twenty-five years. Therefore from a practical standpoint in this particular field of galvanizing there is no harm in having a small amount of antimony in the bath.

Metals Are Added Because They Have Actually Been Found in Practice to be Beneficial

IF we inquire into the reasons for various metal and alloy additions to the bath we discover that there is a very definite practical reason for these additions, regardless of what might be said in theory in text books on the subject. So if we search for the reason that a small addition of antimony is made we find two very important reasons which are: first, because small additions of antimony tend to give a "pearly lustre" to the spangle, and second, it has been discovered in practice that galvanized finishes with a small antimony addition stay brighter for a much longer time on the shelves in the hardware store. Appearance is a vital sales point, and other things being equal if two pails are on the shelf, and one is a dull blue color, and tarnished, and the other has a bright finish like new, with beautiful "flakes" on the finish, the "bright finish" pail will move

Designated as Official Publication by the Wire Association

from the shelf faster than the dull one. Thus we find by actual practical results that a very small antimony addition retards corrosion of the finish, and also from practical experience, no complaints have ever come because of this antimony addition, and no harm to the coating or finish has been observed as a result of the addition. No matter what might be said in a text book as to the harm that impurities in zinc for zinc coatings cause, here we have "practice" doing it for twenty-five years and more, without any apparent harm.

✦ ✦ ✦

How Theory Often Is Developed

IT is a vital thing to understand how many of these text-book theories come into existence, so we will now with the same example, show how such theories often originate. Some years ago, just when the wide strip was being developed, trouble developed with the galvanized coating. A most amazing thing was taking place, the spangles were actually breaking out of the coating just as if they were pieces in a jig-saw puzzle. The base metal was light, and was to be bent and crimped, but even with only slight bending the spangles "jumped" right out of the coating. Everything had to be stopped, and then came a period of investigation as to what was the cause of the trouble. A careful search revealed a most interesting explanation and cause of the trouble. In the metalware division of the same company antimony was used to give the buckets and tubs a beautiful finish, so it was decided to use the same finish for the coating on the new wide strip. This steel however was to be bent and formed, and it was discovered that even a small addition of antimony for this use, caused peeling and flaking of the coating, made the coating hard and brittle, and was the direct cause of the spangles actually "jumping" out of the coating when the steel was bent and formed. So in practice for galvanized pails and tubs and articles in the metalware field, we find a small antimony addition in the galvanizing bath and coating very beneficial; and also in practice in the sheet and strip mill where the galvanized product is to be bent and formed, we find a very small addition of antimony to the galvanizing bath, very harmful. It all happened because the superintendent of the sheet mill liked the finish obtained in the metalware plant of his company, so decided he would use the same finish on his sheets, and get the formula for the required amount of antimony addition from the metal plant. So here we have the explanation for the general sweeping text-book theoretical statement that additions of antimony to galvanizing baths, and to zinc coatings, are extremely harmful because they make the coating hard and brittle, and cause peeling and flaking of the coating. But for the past twenty-five years antimony has been, and is being used today in the field of metalware galvanizing with absolutely no harm, and on the contrary side, with very great benefit both to appearance of the finish, and as an element that greatly retards the atmospheric corrosion of the articles while on the shelves waiting to be sold.

Copper Seems to Be A Parallel Case

CONSIDERABLE detail was given in this previous article cited in regard to the harm or benefit that might be expected from a small amount of copper in the zinc coatings. For the past twenty-five years in contacting the practical phases of the galvanizing industry, the writer has run into small amounts of copper in the zinc, in the galvanizing bath, and in the zinc coatings. While theorists have been discussing the harm that such copper would do in theory, because of having an impure zinc, and from the "impurities in zinc" standpoint, practice goes on with copper in the zinc, in the bath, and in the galvanized coatings, with apparently no harm. It has however taken a very recent practical example to reverse, or counteract perhaps a number of these theories, especially as to the "great harm done." Thus accidentally we find a typical example where copper has been in the zinc used for galvanizing for over 15 years, and far beyond even the limits which the writer has mentioned as not being harm-

Chemical Composition of Zincs Used

The zinc is extremely high quality "Remelt" zinc—

January 30, 1930	
Zinc	97.42
Lead	1.24
Tin	.91
Copper	.16
Iron	.04
Cadmium	.17

January 8, 1931	
Zinc	97.69
Lead	.84
Tin	.77
Copper	.15
Iron	.15
Cadmium	.40

January 25, 1930	
Zinc	97.87
Lead	.98
Tin	.77
Copper	.32
Iron	.04
Cadmium	....

November 9, 1935	
Zinc	....
Lead	.68
Tin	.13
Copper	.13
Iron	.17
Cadmium	.06

November 9, 1935 Another Shipment	
Zinc	....
Lead	1.18
Tin	1.58
Copper	.11
Iron	.04
Cadmium	.26

November 9, 1936	
Zinc	99.11
Lead	.40
Tin	....
Copper	.004
Iron	.06
Cadmium	.38

February 27, 1939	
Zinc	98.70
Lead	.75
Tin	.29
Copper	.07
Iron	.04
Cadmium	.13

November 25, 1940	
Zinc	98.00
Lead	.95
Tin	.65
Copper	.12
Iron	.04
Cadmium	.19

May 16, 1942	
Zinc	97.68
Lead	1.19
Tin	.62
Copper	.23
Iron	.05
Cadmium	.13

February 25, 1944	
Zinc	96.61
Lead	1.25
Tin	1.68
Copper	.08
Iron	.04
Cadmium	.24

These examples show zincs used for 14 years which carry high amounts of lead, tin, copper, and cadmium. All kinds of articles have been galvanized, even work for the Government, with no complaints of any kind in regard to the zinc coating for corrosion purposes and the usual uses for protection against rust.

ful. In addition to much higher copper we also find the metals tin and cadmium in large amounts, especially the tin, and then to top off all previous theoretical ideas on the subject, we find that the zinc used is a "Remelt" zinc, which would appear to reduce everything to the absurd state. But the facts indicate rather how little we really know, as to what may be good or bad in a metal that is used for a galvanized coating. Since this metal has been used, has been in actual service for over 15 years, doing most of the things that "are known to be harmful", we must stop once again like with the antimony and see if our theory is not wrong, and needs a little adjustment, or explanation. No complaints have come from this metal with copper, tin, and cadmium in it, and the coating has been put on all kinds of articles, with apparently good practical results for the past fifteen years.

The Chemical Composition of the Galvanizing Bath

WHEN this remarkable case was encountered, in order to actually check and verify all the facts a sample was also taken of the galvanizing bath, and it was analyzed. The results are shown below—

GALVANIZING BATH

February 25, 1944	
Zinc	96.58
Lead	1.38
Tin	1.43
Copper	.12
Iron	.03
Cadmium	.36

✦ ✦ ✦

Results From A Practical Standpoint

HERE we really have something to think about and ponder over if we are to consider some of the statements we find in the theory of text books. This statement is not made to lower our estimations or value of theory, but rather to illustrate that while we state in theory one thing, practice goes "blithely" along regardless of our theory, and with no apparent harm of any kind resulting. These are practical facts; they are in actual operation right at this very moment, and regardless of what we might say in theory about using copper, tin, or cadmium in zinc for galvanizing, here it is, with not only no practical harm, but actually great benefit. Thus we cannot turn our backs on actual practical things in operation and in existence, to do a lot of theorizing about them, when for the past 14 years no complaints of any kind have come from these facts.

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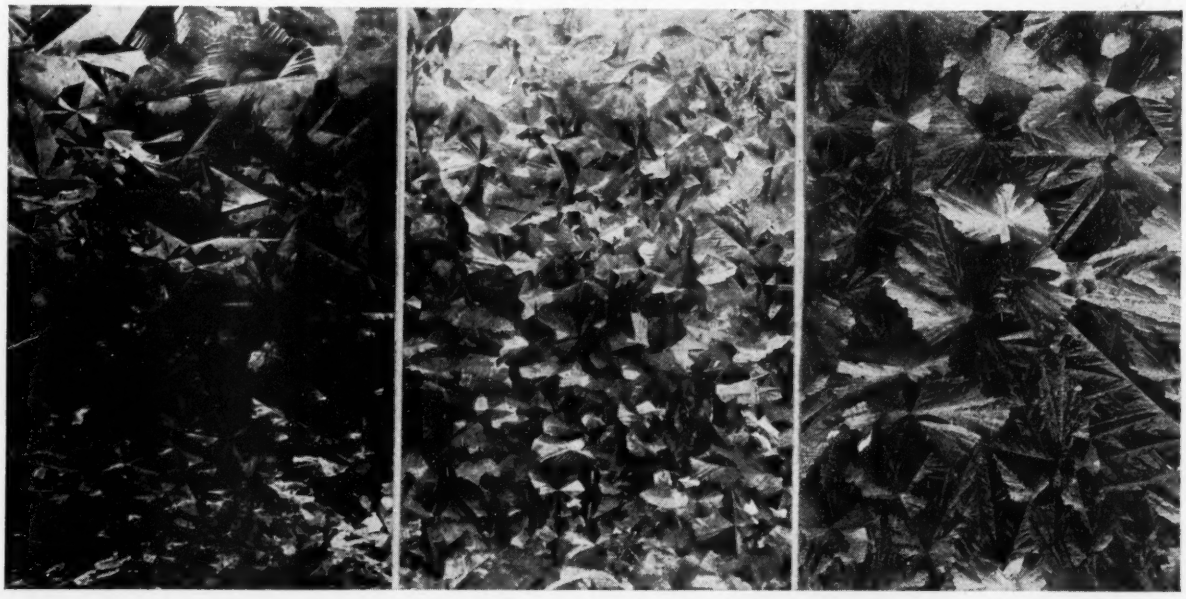
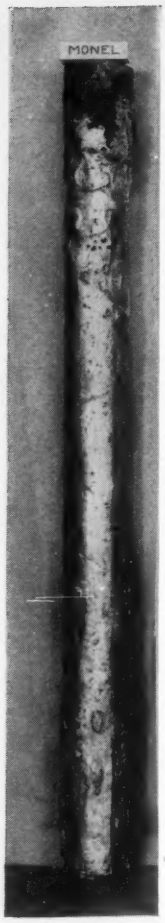
Specific Use Appears to be A Vital Coating Factor

THE sum and substance of the data submitted seems to indicate that the specific use factor for a zinc coating is the determining factor in regard to whether

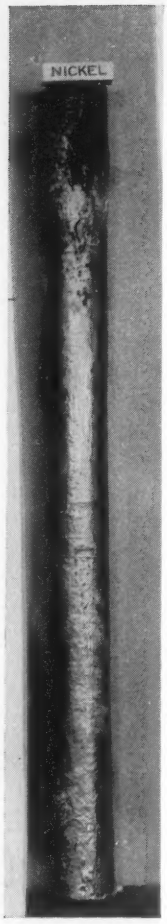


1. Tin spangle. Small addition of tin. ✦ 2. Antimony spangle. Small addition of antimony. ✦ ✦ ✦ ✦ 3. Cadmium spangle. Small addition of cadmium. ✦ ✦ ✦ ✦

Small additions to the galvanizing bath are beneficial and made for a definite purpose. (1) Addition of tin in sheet galvanizing bath to develop tin spangle. (2) Addition of antimony in metal ware bath to dull spangle. (3) A "Pearl Spangle" effect caused by the small cadmium content in the galvanizing bath. Small additions of copper do not affect the spangle or the color of the finish, but theoretically at least, it is thought to aid in corrosion resistance of the coating by forming a zinc-copper alloy top coating carrying a very small amount of copper in solution. ✦ ✦



(a) Monel Metal Rod allowed to remain in zinc bath for 148½ hours. Bath 860 degrees F. Less 120.1 grams. Note the formation of heavy alloy shown in (B). ✦



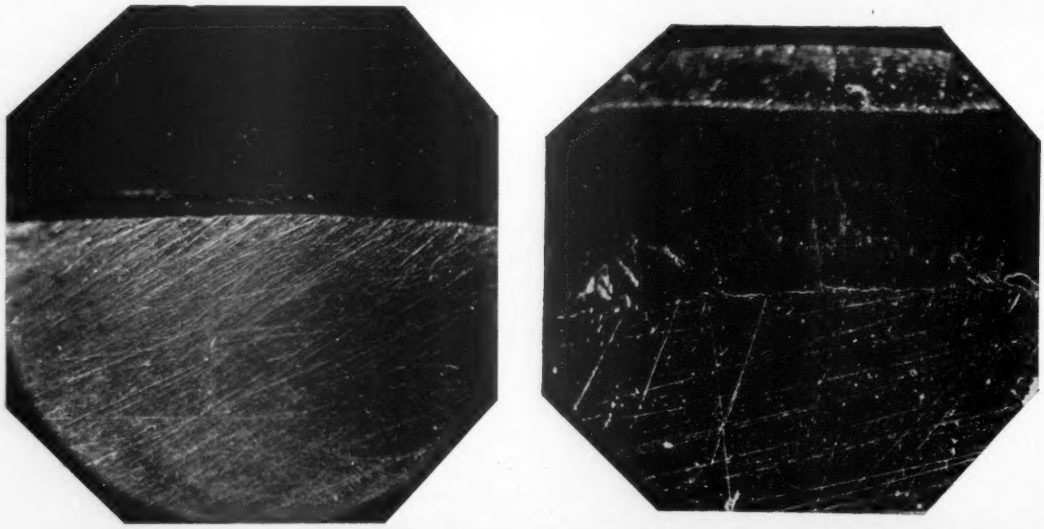
(c) Nickel rod after being in the zinc bath for 148½ hours. Bath temperature 860 degrees F. Less 100.5 grams. Note how very thin the alloy layer is. Same magnification for both illustrations—40 Diameters. ✦

NOTE: The explanation of the results seem to show that less copper will stay in solution than nickel. In the case of the Monel Metal it forms a zinc copper alloy, while in the nickel rod, the zinc appears to be able to dissolve and take more nickel into solution in the zinc. ✦ ✦ ✦

the quality of the zinc is satisfactory or not. For example, one kind of metal may be ideal for very thin coating purposes on a sheet steel that will be bent, formed, and crimped. Another kind of metal may be specifically required to meet the rigid specifications of galvanized wire, while still another kind of metal, which is entirely unsatisfactory for either light sheet coatings, or wire coatings, may be perfectly satisfactory for metalware coatings. And finally there is the heavy zinc coating that is not to be formed or bent, but is put on for the specific use of resisting atmospheric corrosion, such as coatings on high tension tower structures. ✦ ✦ ✦

Specific Use Thus Becomes A Vital Factor Determining Whether A Zinc Meets the Requirements for Definite Conditions. High Percentages of Copper Are Harmful

IN studying the effect of copper in zinc coatings, zinc, and the hot-dip galvanizing bath, it is perhaps well to have a perspective. For example, all galvanizing baths contain a small amount of iron, and while it is undesirable, still it seems to be a necessary evil, and it is taken as a fact that so far none dispute; but all agree a large amount of iron is very harmful



B. Effect of large amount of copper in galvanizing bath seen on monel metal. Note thickness of alloy layer. ✦ ✦

in the galvanizing bath. The same may be said of the metal aluminum which is intentionally added to the galvanizing bath for coating brightening purposes and to keep down the oxidation of the bath surface. Yet a number of galvanizing companies have had to almost empty their pots because they have gotten too much aluminum in the bath unintentionally. The same may be said of other metals. The writer remembers distinctly of one galvanizer telegraphing him, "Pails coming out like canary birds; what shall I do?" He had gotten too much antimony in his bath. Thus when we get right down to it in considering copper in the galvanizing bath it seems to follow the general rule for all metal and alloy additions, namely, small amounts are beneficial, and added for specific purposes; large amounts are "poison" and cause "galvanizing convulsions" until the amount is reduced to the correct amount for beneficial results.

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Sources of Copper

DATA has been herein submitted to show that one source of copper may be found in the zinc (Remelt zinc; it is seldom found in virgin metals smelted from zinc ores, or from distilled zincs); another source was found to be from a muriatic acid dip that had been used to pickle some copper coils; most galvanizers refuse to galvanize castings of bronze or brass because if large quantities of these castings are put through the galvanizing bath, the bath will pick up large quantities of copper, and this will of course cause trouble. At the beginning of the war when there was a distinct shortage of aluminum die castings were used by galvanizers as a metal addition to the bath to get the benefit of the aluminum content. But as shown from the following chemical analysis this scrap material also contained copper.

GRADE #2 ALUMINUM

Approximately	**13 to 95%**	**aluminum**
"	**3 to 4%**	**copper**
"	**1%**	**silicon**
"	**1%**	**iron**

NOW a galvanizing bath adding 200 tons of zinc a month and using approximately 500 pounds of this Grade No. 2 aluminum in the bath added little at a time as needed, would give approximately 20 pounds of copper per month in the bath. This would amount to possibly 5/1000th of 1% of copper to 200 tons of zinc. The question is now, "Will this amount of copper have a harmful effect on the bath, or will it affect the coating so adversely as to not meet specifications say imposed by any branch of the Government?" From the writer's practical experience on the basis of the above data and discussion, it could be said there would not only be no harm, but perhaps some benefit because of that small amount of copper in the zinc.

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What Effect Does the Copper Have

IN a detailed table of the Electrochemical Series of the elements the metal zinc is listed in 21st place, the metal iron in 22nd place, and the metal copper in 33rd place. The basis of hot-dip galvanizing is to be found in the fact that the zinc will dissolve easier than iron, and according to the table, very much easier than copper. There seems to be quite a distinct difference in the results of very small impurities in zinc and fairly large amounts. As a typical example, of what the writer has in mind, when a new galvanizing bath is started up it generally takes a little while before the bath becomes saturated with enough iron to form dross. This point is from .1 to .13 of 1% iron content. Thus if we consider a zinc coating from the bath when it contains say .09% iron content, according to our line of reasoning we would expect that the iron content in this small quantity has actually benefited the corrosion resistance of the zinc. This appears to be actually what happens in practice as for example, many pieces of pole-line hardware have the outer pure zinc layer entirely eaten away by corrosion, and a dark resistant black layer of the zinc-iron alloy forms the protecting layer against corrosion. This would indicate that free zinc will dissolve faster, and easier than zinc that is tied up with iron, copper, or some other small more resistant metal to corrosion than zinc. By this analogy small quantities of copper in solution the same as the iron up to less than the saturation point should actually be beneficial to a zinc coating. It is above this point that the harmful effects evidently result. Thus for example, a large amount of copper that would be picked up from hot-dip galvanizing brass castings would certainly be very harmful in a galvanizing bath, while on the other hand, deliberate copper additions, the same as aluminum, in small controlled quantities so as not to give over 0.25 of 1% should be expected to actually increase the corrosion resistance of the galvanized coating and be beneficial.

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Reactions That Might Be Expected From Such A Copper Content

WITH this very small copper content we should expect the following results. In the Preece Test more dips would result before the coating broke down; in the outdoor exposure in atmospheric field service, a small copper addition should tend to increase the resistance of the zinc coating to corrosion. In this very small addition no outward effect can be seen in so far as spangle change, or color change of the zinc coating is concerned. The theory of the benefits derived would seem to be that the zinc tied up with a small amount of copper is more resistant to corrosion than free zinc above a zinc-iron alloy. The logic of the theory at least seems plausible.

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Conclusions

THE general conclusions that appear to result from this additional practical information on

(Please turn to Page 390)

Rod and Wire Coatings In the Cleaning House

By Floyd M. Hauger,
Vice-President, Standard Industrial Compounds Co., Chicago, Ill.

A paper presented at the Pittsburgh Regional Meeting of the Wire Association, May 1943. ✦

WHEN the subject of coating in the cleaning house is mentioned one may well ask "Why change from the present methods." For instance lime has been used for coating since wire drawing was in its infancy and has given good results. The reason for any change is improvement and with the increasing speed and production requirement needed now per unit of labor, such change is necessary.

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AS Paul said to the Thessalonians—"Prove all things; hold fast that which is good." For our purpose here we are going to assume that the rods or wire are perfectly clean and also have been perfectly inhibited from attack by acid.

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THE next step is concerned with the proper coating of such rods or wire. This step has a three fold purpose the third of which is usually overlooked. First the material used for coating must neutralize any acid remaining on the rod and also it would be a real contribution if it could remove any traces of iron sulphate. Iron sulphate is abrasive and peels very badly. This peeling carries the lubricant with it and causes the metal to run dry. Second the coating should serve as a carrier for the lubricant. This involves definite characteristics in order to serve as an efficient carrier. Third it should prevent rusting or pitting of the surface when the material is stored for any length of time. In consideration of these steps we are going to use lime as the common coating.

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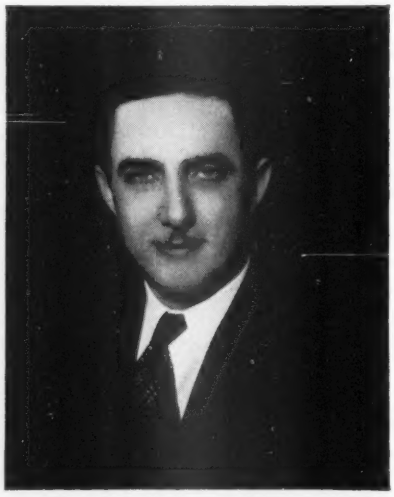
AS a neutralizer lime is only fair. This is true for two reasons. One is the poor solubility of lime in water which means that the acids to be neutralized must come in contact with the lime particle itself which is carried in suspension. On many surfaces this means that it cannot penetrate into the small pits or cracks due to the particle sizes. If such a surface is examined under the microscope it will be found that acid, ferrous sulphate or rust remain in the pit, which one depending, on the time which has passed since pickling. Another reason that lime is only a fair neutralizer is because of the fact that sulphuric acid reacts with it to form gypsum which is also insoluble and which further forms a crust around surrounding lime particles preventing them from reacting with the acid.



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Standard Industrial Compounds Company,
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Majored in chemistry at Knox College graduating with degree of B.S., entered the employ of the Keystone Steel & Wire Company in the chemical laboratory and was later Resident Engineer on Finishes. He then became Plant Superintendent of the Wilson Steel & Wire Company of Chicago where he remained until he joined the Standard Industrial Compounds Company as Secretary and Treasurer. He is now Vice President and in charge of the Plant and Development work.

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MATERIALS containing soda ash and trisodiumphosphate, borax, caustic soda or potash are all much better neutralizers than lime because they are soluble and will penetrate wherever water will go. The products of their reaction with acid are also soluble and will not cause any crust formation. However they are all more or less hydroscopic and this tendency to pick up water out of the air is very detrimental.

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THE ability of any coating to serve as a carrier not only means that it must attract lubricant particles and help to join them to the surface of the material being drawn but such a carrier must have the properties of not being too hard and abrasive. It must be elastic, explosion proof by being water repellent not hydroscopic, and also contain a mutual attraction for the lubricant skin formed in the pressure and heat of the die. Considering hardness of some of the common materials we find that it lines up as follows:

Sodium carbonate, soda ash	**1 — 1.5**
Borax	**2 — 2.5**
Trisodium phosphate	**2 — 3.0**
Calcium carbonate	**3.0**
Calcium hydroxide	**2.0**

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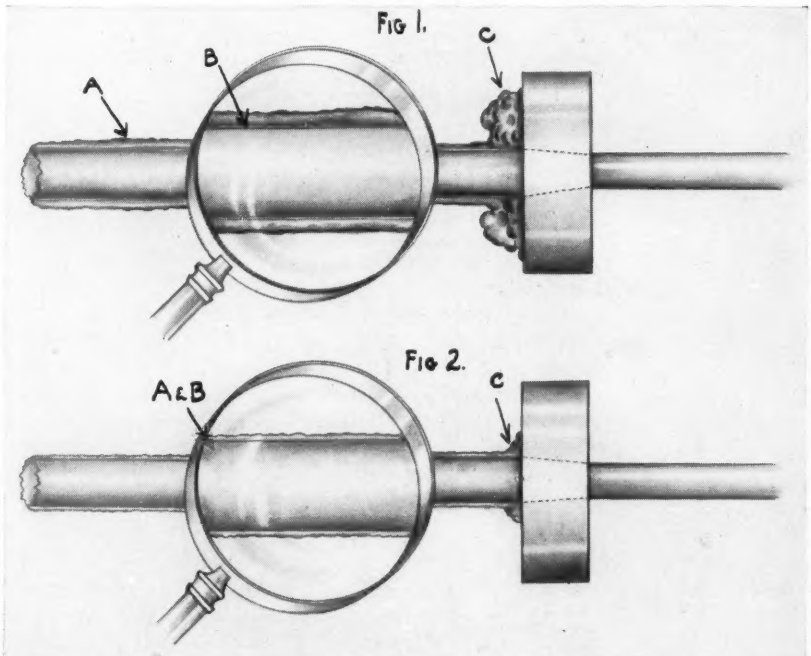
LOOKING at this table it would appear that soda ash was the best of all. This is not the case because it is hydroscopic, absorbing moisture from the air. In fact all of the above materials either absorb moisture, have it in combination or form water by decomposition under the heat and press-

ure exerted in the drawing die. Lime changes its chemical form after coating on metal. In the lime tub depending on the time exposed, calcium hydroxide will vary from 90 to 95%. After dipping and drying the calcium hydroxide content will cary from 78 to 88% The difference is calcium carbonate, which is formed by the absorption of carbon dioxide from the air as in the following formula $Ca(OH)_2 - CO_2 = Ca CO_3 - H_2O$. This chemical change forms water the most of which remains in the coating. Even after lime coating is baked it will be formed. This water present in either case makes a poor coating, as such coating is not then explosion proof. By explosion is meant formation of steam in the die with resulting shattering of the protective film by the pressure thus exerted. If after prolonged exposure to the atmosphere of the coated rod which is then drawn at high speed to wire we examine the coating through a microscope, we will find that this film has an infinite number of holes in it. If on the other hand we take a section of rod on which the coating has been dehydrated and draw it through the same dies and lubricant at the same speed, we will see the film remains uniform and completely covering the surface. Our opinion is that this difference is caused by very minute explosions caused by the entrapped water turning into steam. This is partly theoretical and is only substantiated by the results as above noted. We think this is substantiated further by the fact that all water paste solutions are good at certain speeds and for a limited number of holes. In using water solutions for wet drawing we do not think this theory is disapproved because in wet drawing the first requisite is a coolant for which the water serves. The lubricant film is very thin and it is not too good a film as substantiated by the fact that only light drafts can be taken or the wire will break. Also if we take a wire which has a good film put on in the dry drawing we can get much more speed just by the cooling action of the solution. We have tried this with a coating which was very water repellent and which could not pick up any lubricant from the solution and found that the speed could be doubled over the same grade of wire which had been stripped of its lubricant film and then was relimed with a light coat. Of course, this can only be done where the wire is drawn green with the original coating on it without heat treating or cleaning.

✦ ✦ ✦

NONE of the ordinary coating materials are elastic and the entire job of extending and covering the surface must be done by the lubricant. The coating acts in a sort of latticework, the lime, etc. acting as the frame which stays in the same relative position, one part to another but each draft increasing the space in between. This space must be filled by whatever lubricant we are using. This is accomplished by varying melting points for various analyses of steel. The lubricant must be varied also according to the thickness of the coating material applied. This fact is the most important in the cleaning house or wire drawing mill today and cannot be emphasized too highly. A heavy coating is harmful since that means the lubricant to spread properly must penetrate to the steel surface. It cannot ride along on top of the coating or it will be cut off. If the melting point is lowered enough for it to become liquid so it can penetrate then it will burn up. The heavy coating also is harmful because it cannot all go through the ripper die. It is piled back from the die interfering with the carrying power of the coating which is coming behind. It dilutes the lubricant here and also by a buildup in the lubricant box. (This difference is illustrated in Fig. 1 and 2).



Figures 1 and 2 above, somewhat exaggerated, illustrates the points discussed. Fig. 1. Shows the effect of too heavy a coating on the metal. In this Fig. "A" is the lubricant and coating mixed; "B" is the coating untouched by the lubricant; "C" is the backfeed and packing in the die. Fig. 2. Shows correct coating of the metal "A" and "B" are no longer separated but are mixed homogeneously. "C" is no longer packing and has no backfeed.

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ANOTHER characteristic, the carrier must have is that of being able to mix and unite mutually with the lubricant. We know of no coatings marketed today that have this characteristic. Instead of uniting with the lubricant they all either dilute or are repellent in that they do not form a chemical mixture with the lubricant but

actually prevent the lubricant from attaching itself to the metal. For instance trisodiumphosphate and calcium hydroxide remain as they are put on the metal in their original form although with the calcium hydroxide we get a certain percentage of calcium oxide formed and a very slight amount of calcium stearate. Soda ash forms still more of the stearate or oleate but the greater percentage of it remains in its original form. Because of the fact that they remain more or less in their original form we will find that a lubricant film is spread over the material instead of being attached to the metal surface. As the wire is reduced in diameter and increased in surface area, the coating material which is next to the metal not having elasticity is loosened and eventually peels. Over this bare spot which thus is left there either is no lubricant or the lubricant must by extending properties cover these resulting spots.

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THE third characteristic that any coating should have would be the prevention of rusting or pitting on the surface of the metal when kept in storage. Since most of the materials are hydroscopic or carry a certain amount of combined water, this is practically impossible with present day coatings. A coating which would combine chemically with the metal so as to form an impervious skin and also would not contain or absorb water would be the only coating that would perform this function properly. Briefly we could state that the ideal coating for rods or wire should have the following characteristics:

1. **It should absolutely neutralize any remaining acid.**
2. **It should serve as a perfect carrier and to do this it must have the following properties:**
   - **A. Elasticity**
   - **B. Soft**
   - **C. Attracted to and able to form a chemical mixture with the lubricant**
3. **It should not be hydroscopic or retain water either in combination or by a chemical change in drawing.**
4. **It should unite with the steel surface to form an impervious film so there would be no rusting or pitting underneath on the surface of the metal.**

WHEN we have a coating with the above characteristics then it will be a matter of determining the price of the raw material compared against the savings in die costs, increased speed, more production, and a better tolerance on sizes.

✦ ✦ ✦

LOOKING forward into the practice in the cleaning house both as regards coating and as regards treatment of wire or rods for drawing we can forecast these facts. One is the use of a coating to replace lime where the cost balances the savings involved. This is the use of a material which is acid in character and can do the pickling on lightly scaled work or can supplement the regular pickling and also aid in removing iron sulphate which is a hydroscopic material and other extraneous matter such as particles or hairlines of scale still remaining. This material also has the faculty of reacting with the steel surface so that it becomes a part thereof and also neutralizes the effects of any pickling acid left on the work by a chemical change. Besides these functions it also provides a suitable base which serves as a carrier for the lubricant and also reacts chemically with it so as to form an impervious, continuous, and uniform film.

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SECOND we wish to bring out the fact that the drawing of copper coated and liquor finished wire from dry reels can now be accomplished. Ever since fine wire has been drawn by the wet process, it has been customary to either coat the wire with a copper or liquor finish. There was, of course, a demand for this type of wire from manufacturers who desired this copper finish not only for appearance sake but with the idea that it would not oxidize or corrode as readily as the bright wire.

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I THINK everyone is familiar with the older, wet, sloppy, and often odorous method of running copper or liquor finish wire in the wet wire mill.

THEN comes the discarding of the wet storage tubs which is, of course, a step in the right direction. The wire was cleaned in the cleaning house. After cleaning the wire was dipped in a hot solution. There were quite a few different materials on the market for this purpose with which you are all familiar and although they were called different names they were all basically alkalies which would neutralize any acid remaining on the wire from the rinse, and they mostly contained rosin, rosin soap, or derivatives or a wetting agent. Whatever called they were basically pretty much alike in spite of the differences in the price paid. This rosin or soap or whatever was in the compound was to put on a coating to prevent the bare wire coming in contact with the air and rusting.

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THEY did just this to a degree, some perhaps better than others, but we are not concerned with that here. The result was that none completely did the job, but the mills could get by and did eliminate the wet storage tubs. As the wire was coated directly and went into the copper, the compound was bound to affect the adherence of the coating as well as the coating itself as the alkali would neutralize part of the acid in the bath and the rosin or soap, etc., would contaminate the copper solution to some extent. It is a fundamental of plating that to get a good plate you have to have a chemically clean surface, the cleaner the wire the better the plate. I think that we can all agree on that and yet here we are putting on coating that will not give a clean surface under the plate. Every wire drawer usually coats his own wire and they are never uniform as some will be a rich, copper color and the next will be straw.

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THIS wire still has to be drawn from a wet tub again to prevent oxidation and this is undesirable. So there is the need for drawing from a dry reel. That is, the wire is cleaned in the cleaning house and the copper coating is

also being done there. After coating and rinsing it is dipped in a hot solution and dried. Most of these solutions again have been combinations of alkalies, soap, and rosin to neutralize the acid carry-over from the copper solution and to put over the copper a protective film to prevent oxidation. The wire is then placed on trucks and taken to the mill to be drawn from a dry reel.

✦ ✦ ✦

I HAVE, however, never seen this done successfully day in and day out, but I understand that some are doing it. I heard of one mill that was doing it successfully, at least they were doing it, but a foreman of another mill who had seen this done told me that they would clean and coat one coil at a time then draw it. What I mean doing it successfully is cleaning and coating in the cleaning house, put it on trucks, take it to the mill, and draw it when you please whether it is today or day after tomorrow.

✦ ✦ ✦

RECENTLY a compound has been made and a method developed that will do this successfully. The wire is cleaned, rinsed, given the copper coat, rinsed and then immersed in a light solution of this compound at a temperature of about 170° and kept in the solution for about 30 seconds. It can then be dried by any method available or air dried, placed on trucks, and taken to the wet machines and drawn then or at any time desired.

✦ ✦ ✦

THIS compound has an acid reaction and does neutralize the acid remaining on the wire actually changing it into another compound. Also this compound or part of it actually becomes a part of the wire and this part will not wash off but puts on a coating that is definitely a help in the subsequent drawing. This part of the compound that becomes part of the wire can be removed only by abrasion or acids such as sulphuric, muriatic, etc.

WE feel that there is no question as to the actual help it is to drawing, that die life will be better and that you will get a good uniform coating and color.

✦ ✦ ✦

AS we leave the cleaning house I hope it is apparent to everyone that we might call it the "Cleaning and Pre-Lubrication Department." Without proper cleaning and coating no lubricant is going to perform at top efficiency as we cannot cover surface irregularities and lubricate also.

✦ ✦ ✦

WE expect tonight only to touch briefly on lubrication as this will be the subject of a full paper later. For brevity, we will list certain facts numerically.

✦ ✦ ✦

1. AS we emphasized earlier, the lighter the coating the better lubrication provided enough lubricant is carried in. The lubricant must be tough enough by its own characteristics to keep a film preserved and not a pseudo lubricant which depends on the carrier for its toughness. This toughness can be regulated by melting point and the ingredients used in compounding. It must not burn under high speed or heat but should be left on the finishing hole. The finishing die is the leveler of all lubricants and the final test.

✦ ✦ ✦

2. ANY lubricant should be able to withstand the fast speeds required today, for the optimum production per unit of labor, even though at present, with rates established as they are and almost impossible to change, the time is coming when to stay in the race of competition we must get as much production as a machine will stand. The time also is coming when the wire mill superintendent and his foreman will again have something to say as to how his mill will be run.

✦ ✦ ✦

3. AS yet, though much has been accomplished in lubrication, because of the fact that different wire mills arrive at the same result in different ways many variations are needed. Each mill has some particular condition either in water, sulling, and coating that makes each one a special lubricating problem. Because of this fact die life is often poor for no apparent reason, there is a lot of scrap from scratched wire, or speed is slow. With minor corrections in lubrication due to a particular condition this can all be eliminated, so do not condemn any lubricant too hastily until corrections have been made.

✦ ✦ ✦

4. THE various types of finishes on market wire is an absolute must, since the customer continues to demand brighter wire, cleaner wire, or as in spring wire a finish which will not slip on knotting, on welding wire a finish which will not affect the flow of metal or make the arc wild, a copper coat which will not peel or be off color, a wire which will plate, enamel, tin, or galvanize without cleaning, etc. You know all the demands, and for these there must be special compounds made especially for the purpose. It cannot be a soap or grease or all purpose lubricant but must be made for one use only and must be used that way. The mill operator does not like to have too many different kinds of lubricants around and we cannot blame him for that. In our opinion a mill which produces all finishes and all kinds of wire from stainless to low carbon including cold heading must have six lubricants for best efficiency on all set-ups. Of course, many mills need only two or three.

✦ ✦ ✦

IN conclusion, in compounding a lubricant the following properties must be kept uppermost in mind to obtain the best results:

1. Reduce horsepower requirement and die loss by

A. Low static friction, that is the effort needed to start the movement of one body over another.

B. Low kinetic friction, that is the resistance to motion set up by sliding surfaces after the movement has begun.

(*Please turn to Page 390*)

Wire Association Questions and Answers

Lead Coating of Stainless Steel Wire by the Dip Method

Question #2145

Can you refer me to any literature wherein lead coating of stainless steel wire has been discussed, using the dip method?

✦ ✦ ✦

Answer #1

"We suggest that your inquirer get in touch with the Federated Metals Division of the American Smelting & Refining Co., 120 Broadway, New York City. They are making a specialty of the manufacture of these coatings." (Recently this company published a bulletin entitled "Hot-Dip Lead Plate-Loy" for coating steel or iron sheets, etc.)

✦ ✦ ✦

Answer #2

"Referring to your letter, we suggest that you contact the Allegheny Ludlum Steel Corp. for data on how to successfully coat stainless steel wire with lead using a hot dip method.

We are not in a position to name any definite firm that might be in position to electro-beat stainless steel wire with zinc. Such concerns as Bethlehem, Republic, Roebling and the National Standard Co. have electro-coating equipment but whether they can coat stainless with zinc, we do not know. Would suggest that you contact these concerns."

✦ ✦ ✦

Answer #3

"Replying to your letter, we have recently had some experience with the Metlab Company, 1000 East Mermaid Lane, Chestnut Hill, Philadelphia, Pennsylvania, who have successfully coated wire for us.

They will be glad to coat a sample lot for experimental purposes."

✦ ✦ ✦

Answer #4

"Replying to your letter of Oct. 6th, we are pleased to give you the following procedure with regard to lead coating Stainless Steel Wire. The equipment consists of a pot of molten lead, at a temperature of 700 degrees F., sufficiently large to accommodate whatever size coils are to be dipped. On top of the molten lead a thin covering of flux (molten) is maintained, which consists of approximately four parts of zinc chloride and one part ammonia chloride. Frequent additions to the flux are necessary because of the drag out, and also to keep it active.

The Stainless Steel Wire, in coil form, is pickled absolutely clean, usually with a nitric acid dip being the final cleaning operation. The coil of wire is lowered by any suitable hoist into the lead bath and rotated or submerged by any suitable means, so that every strand is covered by molten lead. When the coil has reached the temperature of the lead bath it should be completely tinned with lead, and is then withdrawn and allowed to drain over the lead tank until most of the surplus lead has run off. The coil is then removed to a water quench tank or sprayed with a cold water hose.

We do not know who is equipped to electro zinc coat Stainless Steel Wire and cannot be of assistance to you on this question."

✦ ✦ ✦

Answer #5

"You pickle, dip into flux, a solution of zinc chloride I think, hold them over the lead pot till they dry, and dunk in the lead. Jim Gore of Atlas Steels in Welland knows about this job."

✦ ✦ ✦

Answer #6

"In the text books on wire, there are no references to lead coating, the only things covered being on zinc, tin, cadmium, copper and other coatings like ferro-oxide finishes, enamels, etc. These would have no interest to you, we suppose.

Two concerns are manufacturing lead coating alloys and can probably tell you how to handle your problems with specific reference to stainless. These are American Machine & Foundry Co., 5524 Second Avenue, Brooklyn, New York, who make "Amaloy" (Address Mr. E. C. Bracy), and American Smelting & Refining Co., Perth Amboy, N. J., who make "Plateloy" (Address Dr. Albert J. Phillips)."

✦ ✦ ✦

The Wire Association is for the specific purpose of improving production methods. It has been organized as a clearing house of ideas on technical problems and research work in all phases of practical wire drawing and wire working.

The inquiries discussed were received from and answered by members of the Wire Association. These inquiries are sent to the Secretary of the Association who acts as a central clearing point, and neither the names of the firms, or individuals sending in the inquiry, or of the men or firms replying are divulged without permission.

Cold Heading SAE 1010 Steel Wire

Question #2144

"We are seeking information on how much the process of Drawing will affect the Tensile Strength of SAE 1010 steel wire.

We have in mind the idea of installing and using a "Bull Block" for reducing the finished size of some of our wire before cold heading. We feel, however, that drawing down, after the steel has laid around for awhile, will increase the tensile strength to a point where we might have trouble in Cold Heading this wire. Also will the Sulcoating be stripped off? If so could we add more lubricant as we were drawing?"

✦ ✦ ✦

As a reminder, SAE 1010 wire is a basic open-hearth carbon steel, the specifications of which are: Carbon, .08 to .13%; Manganese, .30 to .50%; Phosphorous, .040% (Max); and Sulphur, .050% (Max). A number of comments from the field have been received, which are published herewith in the hope that the opinions expressed may add information of value to others engaged in similar operations with SAE 1010 steel wire.

✦ ✦ ✦

Answer #1

"Your friend won't have much difficulty re-drawing for cold heading, unless he is dealing with very exacting work. He doubtless wants to draw only a little way, so as not to have to stock such a large inventory of sizes. Such drawing as that will raise the tensile maybe 5000-10,000 psi, which won't bother him.

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Theoretically it is bad practice to hold drawn wire in stock and then re-draw it; practically in these days of tungsten carbide dies you can get away with murder if you wipe up the blood. Tell him to keep his stock dry, and run his bull block slow. A little lime and dry soap mixture in the die box will do. It really isn't a lubricant, he is depending on the coat already on the wire for that, but it acts as a wiper to push dust off the wire."

✦ ✦ ✦

Answer #2

"Replying to your letter, will state that common practice of making Cold Heading wire from 1010 steel is to draw the material from a hot rolled rod of such standard gauge as to give a 25-35% draft which will require a material perfectly satisfactory for cold heading. In fact in smaller gauges where it is impossible to roll the hot rod small enough, it is possible to give greater drafts and still obtain a satisfactory wire from 1010 grade of steel.

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In drawing such wire if a Sulcoating is used, it is also necessary to use an additional lubricant to give proper satisfaction for cold heading purposes. If it is to be used in closed dies or if it is to be used in open dies, the finish does not make any particular difference. There are on the market today several lubricants satisfactory for drawing cold heading stock with or without Sulcoating."

✦ ✦ ✦

Answer #3

"I have your letter and submit the following comments. It is very difficult indeed to answer this member's inquiry regarding the re-drawing of SAE 1010 Cold Heading Wire because so much

depends upon the type of cold headed product that the author of this letter has in mind. For a very mild cold headed job we might find that although the redrawing has made the wire somewhat harder, it may not be too hard for the purpose intended.

In general, however, it might be stated that it is conventional practice to put as little cold work in Cold Heading Wire as is consistent with obtaining the size and finish desired. This is particularly important for the severe and moderately severe cold heading work applied to relatively large size wire. I assume that the size of this wire is relatively large because your correspondent refers to "bull block".

✦ ✦ ✦

Whether or not the sull coating will be injured by such redrawing is largely dependent upon the condition of the wire at the time it is drawn. Of course, freshly drawn wire can be given a second draft without substantial injury to the coating but wire which has been held in stock for some time may have suffered a deterioration in the coating which might result in some loss of that coating in the redrawing operation. I would suggest in case of trying redrawing that supplementary lubrication in the way of grease or soap very well tempered with lime be tried.

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I would suggest that before this member invests in the bull block, they have a few coils of the wire in question redrawn by someone who already has the equipment in order that they may experiment with it and determine the suitability of the wire for the purpose in mind."

✦ ✦ ✦

Answer #4

"It is presumed that the wire referred to for further drawing has been in stock for several days or weeks. In this case two factors must be considered, the first of which is deterioration of the wire coating or finish. Since cold heading wire is being considered, we assume that the coating is composed of a fairly heavy lime and soap lubricant probably a metallic soap. Unless the wire has been tightly paper wrapped, the coating may have become oxidized to the point of breaking down and allowing the lime to show up in a loose, powdery form. In other words the tight skin film formed in the drawing operation has been broken and hence has lost much of its value as a lubricant for further extrusion or drawing operations. Of course, any degree of rust formation would be even more harmful and in this case the wire should be cleaned and limed before subjected to further drafting.

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The second factor to consider is the possibility of the wire losing some of its plastic properties due to ageing. While it is true that some ageing does take place, the extent depending on the grade of steel and amount of cold work, this factor, in our opinion, is much less important if the wire is to be redrawn direct, than is the quality of the coating. Rimmed steels would be expected to age harden more than killed steels and the ageing effect should be more pronounced in the wire with the greatest amount of cold work. A light initial redrawing draft would be desirable and this subsequent cold work would be expected to nullify some of the age hardening that had taken place, although the final tensile strength would be somewhat greater than wire that had been drafted direct to this size. Consequently, the cold heading characteristics would hardly be expected to be as good as "new" wire."

SPECIAL NOTICE

THE WIRE ASSOCIATION
ANNUAL CONVENTION

will be held at the

WILLIAM PENN HOTEL
PITTSBURGH, PENNA.

October 16-19 inclusive

instead of at

CLEVELAND, OHIO

as previously announced.

The change is due to lack of hotel facilities for our group at Cleveland.

✦ ✦ ✦

For detailed information address

RICHARD E. BROWN,
Exec. Secy.
THE WIRE ASSOCIATION
300 Main Street Stamford, Conn.

—WANTED—

FOR SHIPMENT AND USE IN CANADA

1. 10 to 16 block 16″ wire drawing frame. Must be in first class working order, good gears and blocks, complete with hand pointers and speed reduction gear.

2. One used continuous wire drawing machine, 5 block, for drawing steel wire from No. 5 Gauge rod, 3, 4 and 5 draft. Must be in good condition and complete.

3. 12 block drawing bench having 4 18″ blocks and 8 16″ blocks. For use with high or low carbon steel.

4. Large size wire tinning and galvanizing frame.

All information including specification, age of machine and make, etc., to be supplied with price.

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The Pittsburgh Regional Meeting of the Wire Association

THE Pittsburgh Regional Meeting of the Wire Association was held in the Cardinal Room of the William Penn Hotel at Pittsburgh, Pa., on Friday, May 19th. At the dinner the speakers were **Mr. D. D. Buchanan,** President of the Wire Association and **Dr. J. Hubert Vykeroyd, Ph.D.,** who was scheduled to make the principal address. There was an intermission of 15 minutes following the dinner, after which the technical session was held under the chairmanship of **Mr. Norman Melville** of the Pittsburgh Steel Company. The paper was presented by **Floyd M. Hauger,** Vice President of the Standard Industrial Compounds Company of Chicago, the subject being: **"Rod and Wire Coatings in the Cleaning House".** There was quite a little discussion on the paper and some very interesting and pertinent information was developed on the subject.

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THE meeting closed with the showing of the Navy film, "Seabees — the Navy's Fighting Construction Men the World Over". This is probably the best of the films shown up to this time at any of our meetings.

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IN making his address Mr. Buchanan said:

"Mr. Chairman, Guests and Members; I am pleased to note this year's Pittsburgh Regional Meeting has drawn the interest of so many directors and members of the Wire Association, and I am glad to welcome you here tonight."

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MR. BUCHANAN continued: "This Pittsburgh Regional Meeting is in the heart of the heavy steel industry and heavy tonnage wire plants located in the Pittsburgh area and the middle west. This differs from the fine wire production which New England is primarily interested in.

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"THE Pittsburgh-Cleveland-Chicago district has been large producers of the heavy type steel for the war effort and the contribution made to all of the war has been outstanding. Pittsburgh is noted as a center of the steel industry and there is no doubt that tonnage produced per square foot of area is greater than in any other part of the country.

✦ ✦ ✦

"THE Steel Industry, being a basic industry, is called on to supply all types, grades and difficult specifications of steel for every branch of the Army & Navy and without the expert knowledge built up over a great number of years and the constant development of the industry which has been accelerated over the past twenty years, we would not have been in a position to furnish the requirements necessary in combating the enemy, as many times seemingly impossible specification jobs were put up to the steel industry in the past few years. I believe in every case the skill and accelerated research carried out over the past twenty years has enabled the industry to deliver the necessary materials.

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"WE have many problems today, not only in filling specifications but the problem of changes of personnel; the increased employment of unknown personnel which must be trained, and then also the influences due to a period of war, taxing the supervisory forces to the limit. In addition to these problems, we came into another one during the last couple of years — the employment of women in plants where never before have women been employed, and this has necessitated changes in handling of personnel. In looking into the future, we will be faced with the problem of the returning men of the armed forces, and this will in all probability require another change in handling of personnel. In spite of these many problems the production records set up over the past two years prove that the American people can do a job when once it has a goal set up that must be reached.

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"I THINK we should not lose sight of the great developments made by the suppliers of the steel industry, as without the suppliers of the different commodities used in the manufacture of steel and also in the processing of fine steel and wire, we would have been unable to produce the tonnage required. Many of these supplying companies have carried on research work over years and when it was necessary to bring our production up to maximum they had the material that would do the work.

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"I AM thinking primarily of the development in the wire industry of drawing lubricants and other lubricants for high speed operation of machines. Also of another great contribution that has been made to the industry — on which there has been exhaustive research made — and that Tungsten Carbide dies. These dies enabled wire plants to produce more per hour per machine unit than was ever thought possible twenty-five years ago. This denotes progress and while we speak of only these two developments there are

(Please turn to Page 377)

✦ GOVERNMENT WIRE PRODUCTION INFORMATION ✦

Copper Wire and Cable Mill Advisory Committee Meeting

AT a recent meeting in Washington it was felt that the supply of asbestos for wire and cable was adequate, but that an expanded use for Navy shipboard cable was expected and if this expansion is approved, it may become necessary to limit asbestos to heater cords.

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COTTON sheeting suitable for tape is short; jute is thought to be adequate; a sufficient supply of cotton yarn (30 and under) has been set aside for wire and cable use; koraseal and vinylite should be available, and certainly after June, when new facilities come into production; naphtha is plentiful; and neoprene will probably be limited to such uses for which no substitutes are available.

THE Armed Services have advised that they are unable to get all of the wire and cable they need to meet supply programs. As specifications are often difficult to meet, an effort will be made to determine what specifications can be met at the same time maintaining volume of production.

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THE question of expanding production facilities was discussed, but committee members felt that it would not be possible to man further plants, as they are having trouble to get enough labor for present facilities.

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Use of Corrosion-Resisting Steel

THE Operating Committee on Aircraft Materials Conservation, reports that the corrosion-resisting steel situation has improved sufficiently to warrant removal of restrictions on its use in applications where difficulty has been experienced in converting to available alternative materials, or where continuation or resumption of the use of corrosion-resisting steel would beneficially affect service characteristics, manhours required in manufacture, or cost.

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IN view of the improved situation, all restrictions on the use of corrosion-resisting steels in aircraft, except Directive 14A on the still critical columbium-bearing type, are being removed. Pending the removal of restrictions on the use of corrosion-resisting steels in aircraft contained in WPB Conservation Order M-126, it is suggested that where the use of corrosion-

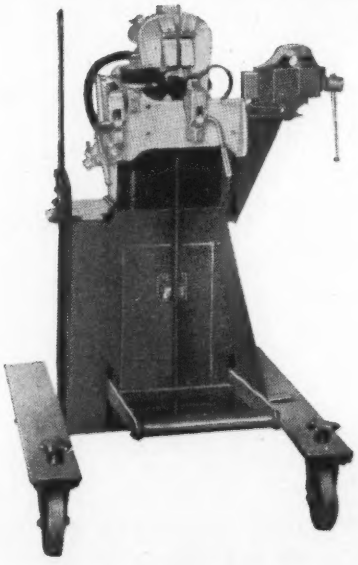
(Please turn to Page 366)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



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Handle all types and sizes.
Controlled zones of heat and circulation.
Rods carried from pass to pass without jamming or marking.

Built in multipass and single pass continuous types, these modern ROSS "Universal" Ovens can be installed to process from 200 to 1200 rods per minute. Maximum flexibility of operation for handling any type of coated rod. Uniform control of air temperature, circulation and humidity throughout heating zones assures speedy production of hard, firm, dry coated rods, regardless of type.

ROSS "Universal" Ovens are used by such leaders as:—Arcrods Corporation in five plants; Metal & Thermit Co.; The McKay Co.; Harnishchfeger Co.; A. O. Smith Co.; Westinghouse Electric & Mfg. Co.; General Electric of Canada—and many others.

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ROSS ENGINEERING OF CANADA LTD.—Dominion Sq., Bldg., Montreal

Government Wire Production Information

(Continued from Page 365)

resisting steel for the items now restricted under M-126 is desired and considered appropriate, an appeal be made through the usual channels on WPB Form 1477. However, existing stocks of alternative materials should be used in the best interests of the Government and nothing in this bulletin should be construed as preventing such use.

✦ ✦ ✦

THE Procuring Services may now, to assure improved service performance, require the use of corrosion-resisting steel for items where alternative materials have been previously permitted. Where such use of corrosion-resisting steel is desired, the Procuring Agency will issue appropriate instructions.

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Wire and Staples for Footwear Procurement Conditions Eased

ALL types of steel staples, as well as steel wire, used in the manufacture of footwear may be treated as operating supplies under the provisions of Controlled Materials Plan Regulation No. 5, the War Production Board has announced.

✦ ✦ ✦

THIS means that steel staples may be obtained through the use of the CMP Regulation No. 5 preference rating and maintenance, repair and operating supplies (MRO) symbol by manufacturers of footwear. Such manufacturers no longer need file applications for allotments of such wire or for preference ratings with which to obtain it.

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New Brass Mill Limitation Order

BEGINNING May 15, 1944, a new limitation was applied to deliveries of brass mill products from warehouse stocks.

UNDER the new limitation, no person shall place orders that aggregate more than 500 pounds gross weight for delivery from warehouse stock of any item of brass mill product to any one destination during any calendar week.

✦ ✦ ✦

THIS new limitation applies to all items of brass mill products except single continuous lengths of rod, tube, pipe, sheet, and strip. Neither the new 500-pound weekly limitation nor the former 2,000-pound monthly limitation, which is retained in the order, applies to condensor tubes or to resale of brass mill products obtained by a brass mill warehouse through an authorization issued by a regional office of WPB.

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Screw Machine Products Production Drops

A DECREASE in output of screw machine products as a result of manpower shortages was reported by members of the Screw Machine Products Industry Advisory Committee at a recent meeting in Washington. Loss of men to the armed services and to other industries in 1943, coupled with recent induction of workers in the 18 through 25 year age group, was reported to have curtailed production in some cases by as much as 20 per cent during the last six months. Further production loss is inevitable, industry members said, if men in the 26 through 29 year age group are withdrawn.

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APPROXIMATELY 82 per cent of the items used in military operations require screw machine products, according to data presented at the meeting. The output of the industry is used almost entirely for direct and indirect military purposes. Consideration will be given to the manpower problem, Government officials said.

(Please turn to Page 374)

Flat Wire
Shows its Quality!
FEED FLAT WIRE into a machine like this Multiple Transfer Press, and you soon find out its quality. Steel analysis, temper, dimensions and finish must be *right*, for fast, efficient working of the stock.
It's at the point of fabrication where Roebling Round, Flat and Shaped Wires show their quality. The years of wire specialization, the men and equipment that stand behind every wire we ship, keep drawing, forming, and stamping operations running efficiently,
Can a Roebling wire, made to meet your specifications, save you time or cost? Write today.
JOHN A. ROEBLING'S SONS COMPANY
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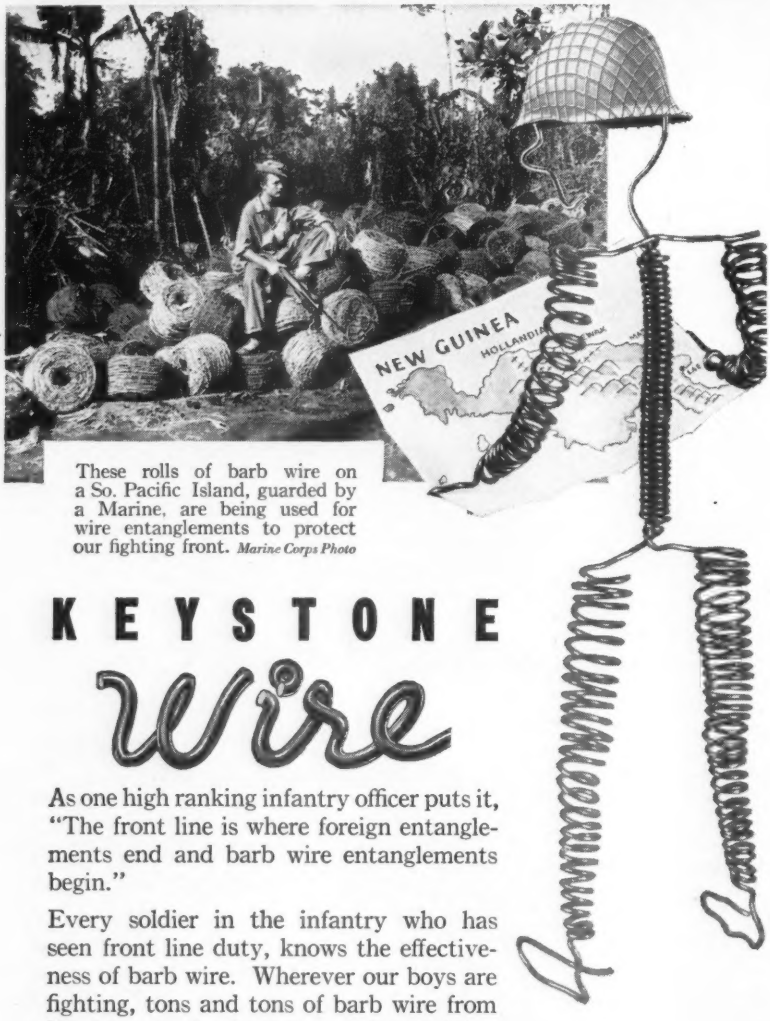
WIRE ROPE AND STRAND • FITTINGS • AERIAL WIRE ROPE SYSTEMS • COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • WIRE CLOTH AND NETTING AIRCORD, SWAGED TERMINALS AND ASSEMBLIES • SUSPENSION BRIDGES AND CABLES

BARB WIRE . . . *Protecting Precious Lives and Materiel*



These rolls of barb wire on a So. Pacific Island, guarded by a Marine, are being used for wire entanglements to protect our fighting front. *Marine Corps Photo*

KEYSTONE

Wire

As one high ranking infantry officer puts it, "The front line is where foreign entanglements end and barb wire entanglements begin."

Every soldier in the infantry who has seen front line duty, knows the effectiveness of barb wire. Wherever our boys are fighting, tons and tons of barb wire from Keystone and other wire mills are helping them hold the lines of freedom. Not only has barb wire gone to war — it is helping win it! Thousands of other products made from wire are also needed for ships, tanks, planes, guns, ammunition, and other materiel.

But as soon as the fighting ends or Victory is definitely near, Keystone wire will again become available for civilian production.

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Special Analysis Wire for All Industrial Uses

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Your **SCRAP METAL** is still vitally needed!

Develops New Basic Resin

THE U. S. Stoneware Company has announced the current availability for limited commercial and experimental use of a new basic resin having widespread immediate applications.

✦ ✦ ✦

THE resin, named **Duralon,** a furane derivative, is characterized by the lowest water absorption of any organic resin, insolubility (after activation) in any solvent or combination of solvents, high electrical resistivity, absolute stability in storage and handling, and by ease of workability.

✦ ✦ ✦

THIS resin, in its pure form, is a heavy, viscose liquid, dark maroon in color. On incorporation of catalysts and application of mild heat Duralon reverts to an extremely hard, dense, black substance. Varying physical, chemical and electrical properties can be developed in the base resin by incorporation of the usual fillers and lubricants.

✦ ✦ ✦

THIS resin is readily soluble, before activation, in many inexpensive hydrocarbons, as well as in ketones and chlorinated solvents.

✦ ✦ ✦

WHILE preliminary studies indicate that the resin possesses definite molding possibilities, its paramount immediate importance is as an impregnant, as a laminating and bonding agent, or as a protective coating material.

✦ ✦ ✦

SOLUTIONS may be applied as coatings by any of the conventional processes, or may be used for impregnation.

✦ ✦ ✦

NO particular surface preparation is needed before application of these coatings, nor is a prime coat necessarily required.

✦ ✦ ✦

SOME of the applications of interest to the wire field are as

follows:

As an impregnant for plywood, masonite, stone, asbestos, concrete, glass fibre, paper or other porous materials.

As a wetting, plasticizing or tackifying agent for synthetic rubber compounds, or as a modifying agent for other synthetic resins.

As a protective coating for armature wire, or for any wire where unusual flexibility is not required. As an electrical insulating material Duralon shows unusual resistance to arc flashover and to tracking.

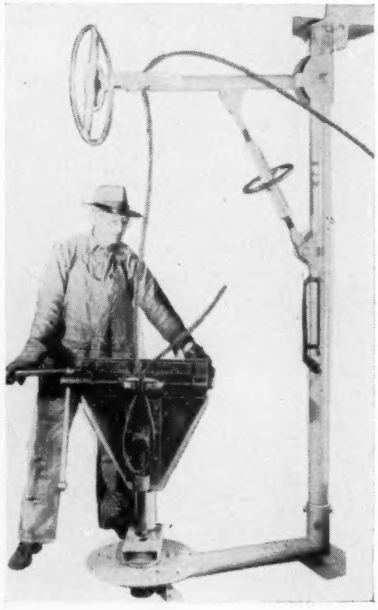
✦ ✦ ✦

PERSONS interested in securing complete details as to the properties of Duralon, may secure it from the company at 60 East 42nd Street, New York City.

✦ ✦ ✦

New Cable Splicing Rig

THE new Gar-Bro Cable Splicing Rig is a structually self-contained unit designed to facilitate all the necessary operations in the splicing of cable.



ANY standard splicing vise may be attached to the stand which is supported by a ball-bearing revolving base. Directly above the splicing vise is a quick opening jaw type vise supported by a tension member. The gripping vise is rapidly actuated by spinning a large heavy rimmed wheel. Any desired tension is put on the cable between the two vises by vertical adjustment of the tension member through a double-acting screw provided with a hand wheel. The cable is easily untwisted for splicing by revolving the splicing vise stand.

✦ ✦ ✦

FOR compactness in shipping and handling, the top and bottom members are detachable from the verticle member. The unit may be set up, bolted to a column or post, or lashed to a tree and be working in ten minutes. Provision is made for mounting either vertically or horizontally by means of mounting pads. The overall size, set up, is 96" x 45". The weight is 250 lbs., approximately, and no section weighs more than 100 lbs. A perforated shelf mounted on the back of the splicing vise stand holds Marlin spikes and other hand tools. Hooks are provided on the vertical member for other tools the workman uses.

✦ ✦ ✦

EQUALLY useful as a portable or as a permanent installation, it is manufactured by **Garlinghouse Brothers,** 2416 East 16th Street, Los Angeles 21, California.

Precision
HYDRAULIC TESTING MACHINES

Pendulum load indication is more accurate and dependable because it operates on the natural laws of gravitation. This principle of operation is not affected by temperature changes or subject to metal fatigue. .

. . . have simplified the science of testing the physical properties of materials and substantiated the accuracy in results in the words, "One Test is Worth a Thousand Expert Opinions". Today, throughout America's wartime industries, Riehle Testing Machines are ferreting out material weaknesses and defects; avoiding failures before they occur. This technique of progressive testing on the production line and research saves valuable machine and man-hours. Write for descriptive literature and quotations.

ARMY E NAVY

RIEHLE HYDRAULIC TESTING MACHINES

Riehle Testing Machine Division, American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

Other Products: IMPACT TESTERS • VICKERS HARDNESS MACHINES
BRINELL HARDNESS TESTERS • MEASURING INSTRUMENTS

Outstanding Personalities of the Wire Industry

John F. Hazen, Bethlehem Steel Company

JOHN F. HAZEN, formerly Manager of Sales, Wire and Wire Products, Bethlehem Steel Company, died April 14, following an illness of several months. He had retired from the Steel Company Dec. 1, 1943.

MR. HAZEN was born in Cincinnati, Ohio, in 1878, and attended the University of Cincinnati. He spent his entire business career in the steel industry, and was especially identified with the development and sale of wire and wire products.

HE began work in 1897 with the Riverside Iron Works and in 1900 joined the American Sheet Steel Company. In 1902 he was employed by the Pittsburgh Steel Company where he served as General Manager of Sales from 1919 to 1926, when he became associated with the Bethlehem Steel Company.

✦ ✦ ✦

MR. **Hazen** was widely known throughout the steel industry with which he had been associated for so many years and enjoyed an especially broad acquaintance in the wire trade, being one of the best known men in the merchant wire and manufactured wire industries in the United States. As Manager of Sales, he had a prominent part in the promotion of many wire products for the Bethlehem Steel Company, and was especially identified in the development and marketing of electrolytically coated zinc wire and other special wire products.

✦ ✦ ✦

Wilbur B. Driver Becomes Chairman of Board

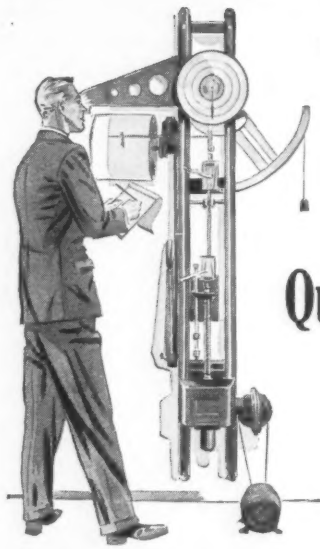
ANNOUNCEMENT has been made of the resignation of **Wilbur B. Driver** as President of the Wilbur B. Driver Co., Newark, N. J.

✦ ✦ ✦

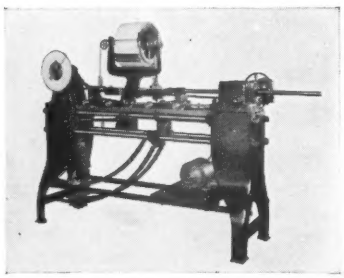
MR. DRIVER is succeeded by **Robert O. Driver,** as President. Robert O. Driver has been active in the Company's affairs for ten years. Other appointments include **William J. Wind,** Vice President in charge of Production; **Sidney A. Wood,** Vice President in Charge of Sales, **Karl R. Tallan,** Secretary and Treasurer.

✦ ✦ ✦

THE Directors continue unchanged. These are, in addition to the above, **Conrad Frey** of Mass & Waldstein, **Peter Igoe** of Igoe Bros., **A. E. Van Cleve** of Crucible Steel Co., and **George Wesson,** formerly President of Topping Bros.



*SCOTT TESTERS promote Quality and Production!



*Scott Testers possess advanced featured which greatly facilitate rapid, accurate testing. Results are recorded in picturized form, the readings and charts being easy to interpret and permanently useful as records of research, purchase checking, production control and inspection tests. 60 models are available for tensile, hysteresis, flexing, twist, burst, compression-cutting of rubber covering, adhesion, etc., etc. Equally as advanced as the features of *Scott Testers is the Service that we offer —always ready and eager to assist in working out your wartime testing problems.

Model Q-7 Scott Tester. Heavy duty tensile tester for wire, with capacity up to 2,000 lbs.

Request Bulletins

HENRY L. SCOTT CO.

55 Blackstone St. SCOTT TESTERS Providence, R. I.

*Registered Trademark

Scott Testers — Standard of the World

THE Company has developed in 25 years from nothing to its present important position in the wire industry, where it operates three plants in Newark, where they do melting, hot rolling, cold drawing and cold rolling.

✦ ✦ ✦

BESIDES their regular line of special alloys, copper nickel, nickel chrome, monel, pure nickel, filament and carbonized nickel bars, rods, strip and wire, the company has recently undertaken the production of beryllium copper bars, rods, strip and wire, which they call "Beraloy."

✦ ✦ ✦

Eugene J. Reardon, Chief Engineer, American Steel & Wire Co.

MR. **REARDON** was educated at North Eastern University where he studied metallurgical engineering. In August, 1936, he was appointed superintendent of the New Haven plant and two years later was named general superintendent of the New Haven and Trenton, N. J. plants. Since January, 1942, he has been assistant chief engineer of the Wire Company.

✦ ✦ ✦

W. O. Everling, Director of Research, American Steel & Wire Co.

W. **O. EVERLING** has been appointed director of research of the American Steel & Wire Co., U. S. Steel subsidiary, succeeding J. S. Richards, deceased. **R. H. Barnes** has been named assistant director of research to replace Mr. Everling.

✦ ✦ ✦

Aluminum Co. of America Metallurgical Appointments

C. **F. NAGEL JR.**, chief metallurgist of the fabricating division, has become chief metallurgist of a newly created metallurgical division of the Aluminum Co. of America, Pittsburgh. **T. W. Bossert**, who has been in Mr. Nagel's department since 1930, serving as assistant chief metallurgist of that division for the past nine years, succeeds him. **C. L. Dunham** was made chief metallurgist of the reduction division and **H. J. Rowe** has been promoted to chief metallurgist of the castings division, with headquarters in Pittsburgh.

✦ ✦ ✦

Michel Nigro

MICHEL **NIGRO**, inventor and mechanical engineer, well known in the machine and wire spring industries, who retired five years ago because of ill health, died in Worcester, Mass., April 21, 1944. He was 62 years old.

✦ ✦ ✦

HE was widely known in the machine tool industry and was credited with more than 50 inventions, mostly for wire forming and spring coiling. He retired five years ago because of ill health.

(Please turn to Page 372)

2 BX Mossberg Carrier

MOSSPEED BRAIDER CARRIERS

Represent

Improved Braiding at Lower Costs

The patented MOSSPEED spring tension take-up makes it possible to increase the speed of the maypole-type braiding machine. An effective increase of 80% being obtained in many cases.

The new (x) type MOSSPEED high speed carrier permits the rapid changing of tension springs making this an ideal carrier for braiding all kinds of yarn (cotton, rayon, asbestos, jute), in addition to fine strands of copper wire.

Consult our engineers regarding your braiding problems.

2 SE Copholder

Complete line of both MOSSPEED carriers and metal copholders for all sizes and makes of maypole type braiding machines.

MOSSBERG
Pressed Steel Corp.
18 West Street
Attleboro, Massachusetts, U. S. A.
Ross Whitehead & Co., Ltd., Montreal and Toronto, Canada.
James Day (Machinery), Ltd., "Ford House," 88 Regent Street, London, W. I., England.

Outstanding Personalities of the Wire Industry

(Continued from Page 371)

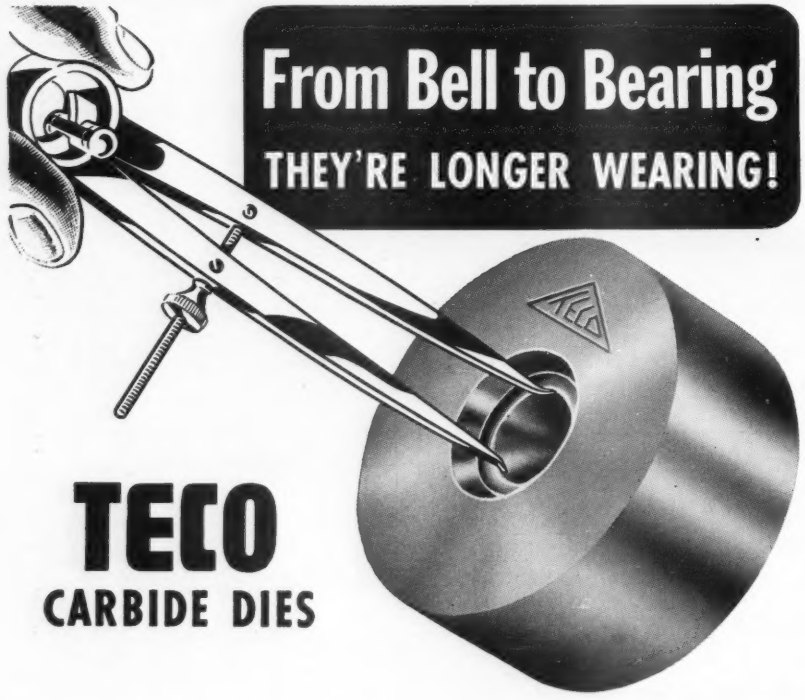
MR. NIGRO, who came to this country from Italy 44 years ago, held 35 patents. He was employed at various times by Sleeper & Hartley, Inc., American Steel & Wire Co., and Crompton & Knowles Loom Works. He was superintendent of Sleeper & Hartley more than 10 years.

Allegheny-Ludlum Appointments

DR. LAURENCE C. HICKS has been appointed metallurgical engineer and associate director of research in the Magnetic Products division, Allegheny Ludlum Steel Corp., Pittsburgh.

✦ ✦ ✦

R. H. THIELEMANN, formerly associated with the research laboratory of General Electric Co., Schenectady, N. Y., has been named development engineer for Allegheny Ludlum.



The greatest strain on a wire die is right at the entrance angle . . . between bell and bearing. And it's there that TECO Cemented Carbide demonstrates the exceptional wear resistance that produces greater tonnage per die — reduces stoppages for die changes — gives a better finish.

TECO Cemented Carbide is slow wearing because of its intense hardness — smooth wearing because of its uniform, dense structure. Prove these facts in your plant with a test run. Let us know your needs.

WIRE and BAR DIES—SIZING DIES
EXTRUDING DIES — TUBING DIES
Carbide Blanks, Tools, Bits, Reamers, Broaches, Forming Tools

TUNGSTEN ELECTRIC CORPORATION, 564 39th St., Union City, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects & Builders Bldg., Indianapolis, Ind.

TECO Pioneers in Tungsten Carbides for over a Quarter Century **CARBIDE DIES**

Editorial Correction

THE article published in the May issue of WIRE AND WIRE PRODUCTS under the title of, "The Cold Rolling of Narrow Strip and Its Equipment Requirements" and credited to **R. J. Wean,** President of the Wean Engineering Co., Inc., was compiled by **F. J. Keller,** Vice-President of the Broden Construction Company and should have been published under his name.

✦ ✦ ✦

American Steel & Wire New Worcester Mill

THE recently completed wire mill, part of an elaborate rehabilitation and improvement program undertaken by the Wire Company in Worcester, is not only the finest wire mill in New England but ranks as the largest of its type in the East. In the Wire Mill building, which extends over an area approximately 1/5 of a mile in length and 500 feet in width is housed all the necessary equipment to manufacture all grades and classifications of low carbon, high carbon and alloy steel wire and strip.

✦ ✦ ✦

THE number of uses to which wire and wire products are put in instruments of war is practically limitless. Literally countless thousands of individual items — some of them relatively small in size — total up to a tremendous tonnage, making a vital contribution to the construction of war machines for the Allied Nations.

✦ ✦ ✦

FROM the wire drawing rooms, the cold roll department and the various other units under this one roof, pour forth the strategic materials needed for the activities of the armed forces. In one section of the new mill great quantities of stapling wire, aircraft stitching wire and stitching wire for G. I. shoes are drawn and processed. Also produced are the bundling and packaging wires which secure the crates and boxes containing the vital foodstuffs and hospital supplies for our fighting

men. Here is drawn the wire for the springs in the intricate mechanisms of anti-aircraft, anti-tank and machine guns, ammunition and other precision instruments of modern warfare. Fragmentation bomb wire for bomb casings is an important part of daily production. A large percentage of the wire produced is employed in the formation of protective sheathing for shipboard and submarine cables. Workers in other departments draw wire for especially designed wire rope used in the anchor lines of barrage balloons, field strand and rope for the Army or for use in the control cables in Navy aircraft.

✦ ✦ ✦

MUCH of the mill output goes to manufacturers to be fabricated into screws and bolts for use in the assembling of airplanes, tanks and guns as well as in the construction and repair of ships and landing barges. Many of the products of the Nail Mill facilitate the construction work of Army engineers which must be accomplished at a rapid-fire pace. These products also find their way into sturdy wooden vessels and barges.

✦ ✦ ✦

FROM the output of strip steel which issues from the cold roll department of the Wire Mill are manufactured knives, feeler gauges, razor blades, saw blades and many other of the countless items used in modern warfare and production.

✦ ✦ ✦

THROUGHOUT the mill these varied wartime products are kept constantly moving from the production and processing operations to the shipping platforms. A special truck materials-handling system hastens the progress of the invasion supplies on their way with comparative ease and rapidity.

✦ ✦ ✦

TYPICAL of the vital importance of the new mill are some of the annual capacity figures, which include 125,000 tons of steel wire, 13,250 tons of cold roll strip steel, 15,000 tons of nails and 35,000 tons of galvanized products.

"Jewels of Industry"

A NEW folder, Jewels of Industry, just released by **Continental Machines, Inc.,** manufacturers of precision gage instruments, points to the significance of Eli Whitney's dream of interchangeability, and his important contribution to industry which has developed today's system of mass production.

✦ ✦ ✦

MODERN industry's dependence on precision gages is shown by gage blocks and gage instrument applications. Copies of this folder are available upon request from Continental Machines, Inc., 1301 Washington Ave. So., Minneapolis 4, Minnesota.

Make Your Plans Now to Attend the Wire Association Convention Pittsburgh, Pa. October 16-19, 1944

Tests TELL THE TALE

Here's one thing you can bank on, whether you use Hubbard welded steel or steel-tired wooden spools and reels. Hubbard products keep abreast of developments in the fields they serve through a continuing research program. Rigid tests are made of every construction and design feature incorporated in the reels and spools you buy.

This constant fact-finding program, plus Hubbard's long experience, serves you two ways. It makes an easy job of securing the *right* spool or reel for your purpose. It adds value to the service you offer your own customers. Don't settle for less than your product deserves — write today for all the facts on Hubbard spools and reels.

HUBBARD SPOOL COMPANY
1624 CARROLL AVENUE | CHICAGO, ILLINOIS
Since 1912, manufacturers of wire drawing and annealing, and shipping spools and reels.

Government Wire Production Information

(Continued from Page 367)

Incandescent and Fluorescent Lamp Industry

THE supply of tungsten and molybdenum for incandescent and fluorescent lamps is about the same as it was a month ago, at the time of the previous meeting of the Committee, WPB officials reported. Total allotments of tungsten to the members of the industry for use in May and June average slightly more than 5100 kilograms per month. Allotments of molybdenum for the same two months average around 2300 kilograms. Unless military demands for tungsten and molybdenum increas unexpectedly, tungsten and molybdenum will continue to be allocated to the lamp industry at approximately the same rate during the remaining months of this year.

Bolt, Nut and Rivet Notes

THE chief topics discussed at the last meeting of the Bolt, Nut and Rivet Industry Advisory Committee were the supply situation for steel rod and wire and alloy steel wire, redistribution of idle and excess stocks, the truck and trailer production program, paper box supply and conservation, and manpower, the War Production Board advises.

✦ ✦ ✦

MEMBERS reported that, in general, the industry is receiving adequate supplies of carbon steel rod and wire.

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THE alloy steel now in common use (No. 4037) is generally satisfactory. The practicability of using triple alloy steel (No. 8630) was discussed in detail. It can be used for large bolts and other items without close tolerance, members said, but is not satisfactory for all products. Difficulty is encountered in using it for diaphragm bead bolts and Phillips recessed head screws.

✦ ✦ ✦

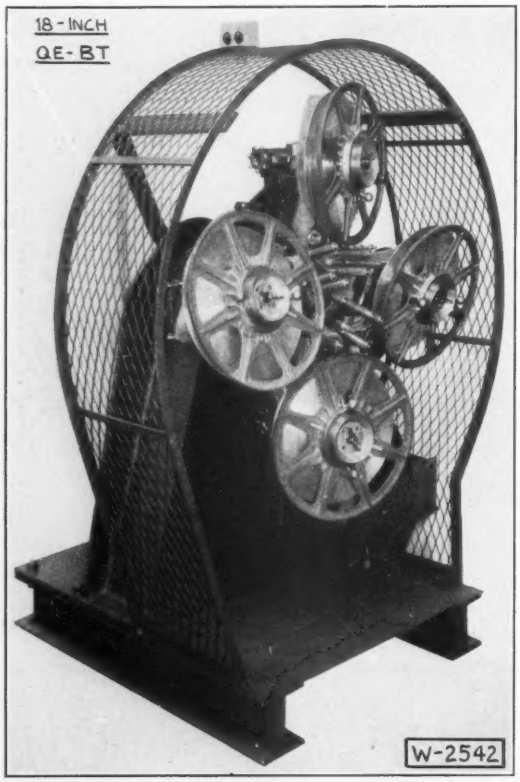
MUCH triple alloy is used in large non-precision items, Government officials said, but it cannot be used for railroad rails, deep drawing stock or welding. Tool life is cut approximately in half in heading with triple alloy, industry members said, and its complete use would result in serious loss in productive capacity for cold headed items.

✦ ✦ ✦

COMMITTEE members recommended that lists of surplus material, coming under the provisions of Priorities Regulation 13, including bolts, nuts and rivets, should be submitted to WPB field offices and that current excess and idle stocks should be redistributed as soon as possible.

✦ ✦ ✦

THE combined military and civilian truck-trailer program is



THE WATSON MACHINE COMPANY
ESTABLISHED 1845
PATERSON, NEW JERSEY, U. S. A.

ELECTRICAL WIRE and CABLE and WIRE ROPE MACHINERY

Eccentric Taping Heads Type "BT" for all non-metallic tapes. Patented constant tension. Available in many sizes and combinations. All anti-friction bearing, magnesium and aluminum alloy construction. Rapid self-locking adjustments. Automatic stops and signal lights. Fixed selective multi-speed tumbler or infinitely variable speed head drives. —

Metal tapers and high speed, dynamically balanced concentric tapers are also offered and employ the same patented principles.

LITERATURE ON REQUEST

the largest in the history of the industry, the Committee was informed. In addition to large military requirements, nearly 130,000 civilian trucks are to be produced, and certain critical components have been scheduled. Bolts, nuts and rivets required for the program are not scheduled but orders should be placed as far in advance as possible, since requirements will be large. About 153 pounds of bolts, nuts and rivets are used in the average truck.

✦ ✦ ✦

The International Copper Position

THE Combined Raw Materials Board recently issued the following statement concerning the international copper position:

✦ ✦ ✦

"EARLY this year, the British copper position has eased sufficiently for the United Kingdom to plan reducing its purchases of copper from Northern Rhodesia and other sources of supply. The United States' position, however, has continued to be tight, and this situation has been worsened by the prospective decline in United States copper production because of manpower shortages."

✦ ✦ ✦

"THE whole question of copper supplies in 1944 has been under review by the Combined Raw Materials Board and it has been decided that in order to safeguard the Allied nations' copper position, production from all sources should be maintained as far as practicable. Any production from sources hitherto allocated to the United Kingdom in excess of that country's agreed requirements will be made available in 1944 to the U. S. A. or the U. S. S. R. as may be arranged in agreement with the appropriate authorities of the countries concerned."

✦ ✦ ✦

PRODUCTION in Northern Rhodesia will be continued at the full rate obtainable without abnormal capital expenditure and taking into account available labor force.

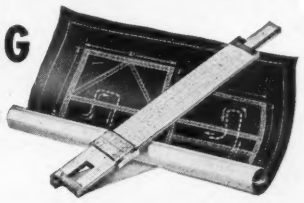
Fidelity Machine Company Wins Army-Navy Production Award for Third Time

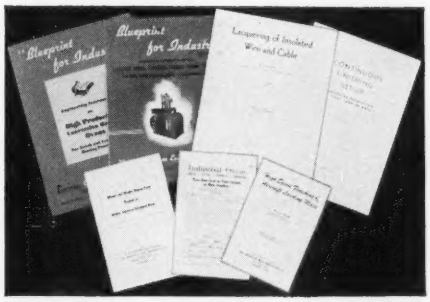
UNDER Secretary of War, **Robert P. Patterson** of the War Department, on April 15, 1944 advised the men and women of the Fidelity Machine Company that they had won for the third time the Army-Navy Production Award for high achievement in the production of war material.

THIS is the second white star to be added to the Fidelity Army-Navy "E" Pennant and it is in recognition of the continued maintenance of high standard set for production by the company.

The 1944 Convention of the Wire Association will be held at PITTSBURGH, PA. October 16-19 Inclusive

OVEN ENGINEERING NEWS



When Post-War Planning Stops And Post-War DOING Starts . . .

You'll Find This Oven Engineering Data Even More Useful Than it is Today

In tomorrow's highly competitive market, an efficient oven materials handling system may make the difference between profit and loss. If you are planning any operation which involves oven processing, you'll want these engineering books, technical articles and reprints. All are free; just check the ones you want and send us this page.

Above, left to right:

[ ] **Blueprint for Industry, Part II**—An 18-page brochure on high-production ovens for batch and continuous heating processes.

[ ] **Blueprint for Industry, Part III** — Complete engineering information on our constant-speed, constant-tension wind-up machine for wire, cable, textile, tapes, coated fabrics and other continuous materials.

[ ] **Lacquering of Insulated Wire and Cable** — A 16-page article on cable lacquering techniques and equipment.

[ ] **Continuous Finishing Set-up Facilitates Production of Steel Landing Mats** —A magazine reprint describing production and finishing of portable aircraft landing mat sections.

[ ] **Allison and Wright Engine Parts Treated in Unique Conveyer-Equipped Oven**—Illustrated reprint.

[ ] **Three-zone Oven for Paint Finishes of Metal Furniture** — Reprint describing an interesting automatic finishing installation.

[ ] **High Speed Finishing of Aircraft Landing Mats**— This reprint gives a different treatment of landing mat job mentioned above.

CURRENT DATA

[ ] Our present series of advertisements, "Oven Engineering News", is also available in reprint form; why not send for it?

(This is No. 10 of a series. Reprints of previous advertisements will be sent free upon request.)

THE INDUSTRIAL *Oven Engineering* COMPANY

11621 Detroit Avenue **Cleveland, Ohio**

Western Electric to Operate Plant At Scranton, Pa.

UNDER an agreement reached today (May 11th, 1944), the **Western Electric Company** will take possession of the Defense Plant Corporation's factory at Scranton, Pennsylvania. This expansion of the Company's war production was arranged through the Signal Corps. It will enable Western Electric to transfer a portion of its wire and wire-products operations from its Works in Baltimore, Md., where additional production for the Armed Forces will then be undertaken. The Scranton plant becomes a "satellite" of the Baltimore Works which is under the direction of J. R. Shea, Works manager.

✦ ✦ ✦

THE Scranton plant adds approximately 87,000 square feet of manufacturing space to Western Electric's facilities. Training of employees at the new location will begin as soon as equipment formerly used in the production of aircraft piston rings can be removed. Finishing operations on wire, cords and cable, according to Western Electric, will give employment to about 1,000 people most of whom will be women. Shipments from Scranton will begin within 60 days, it is estimated. Present plans anticipate a two-shift, six-day work week. Building alterations and the installation of the necessary facilities must be completed before peak production can be reached.

✦ ✦ ✦

New Self-Adapting "Frostpoint" Announced

A self-adapting "Frostpoint" spot welding electrode for use with standard electrode holders, eliminating the need for adaptors, is announced by **Frostrode Products,** 19003 John R, Detroit 3, U. S. A. Previously, adaptors were required to separate the cooling refrigerant in the "Frostpoint" from the water circulation in the electrode holder for welding in the 0°F. range. While this design still provides maximum efficiency for "Zero welding" the widespread use of "Frostpoints" for spot welding operations even above the zero range led to the development of a simplified design. While retaining the controlled coolant flow, increased cooling surfaces, replaceable finned cap and other features of the standard "Frostpoint," the new electrode provides complete interchangeability with conventional electrodes. Available in 5/8" and 7/8" O.D. and any standard length.

✦ ✦ ✦

New Di-Acro Shear

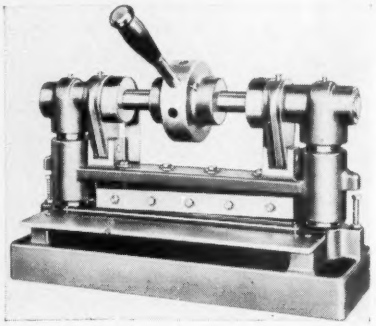
O'NEIL-IRWIN MFG. CO., Minneapolis 15, Minn., has just placed on the market the Di-Acro Shear No. 3, which embodies all of the improved features of nine earlier models developed in the last four years.

✦ ✦ ✦

THIS machine is precision built, of heavy and rugged construction, and allows the material cut to be loaded automatically into

WAR calls for a lot of WIRE
WIRE • SCREEN WIRE CLOTH
POULTRY NETTING • NAILS
● From the fighting front, all the way back to the production line, wire has innumerable war jobs to do—tough tasks that show up just how good modern wire can be made. Cortland Wire is in service on many fighting and production fronts, performing essential tasks that generally are unseen and unsung.
Whether it is for armor wire, wire cloth for airplane air filters, aircraft engine casting pins, or wire for the common nail, performance is the real measure of wire value. And on the basis of performance, Cortland Wire has been exceeding the strictest specifications—the result of Cortland's more than 70 year experience in making America's finest wire and wire products.
WICKWIRE BROTHERS, INC.
CORTLAND, NEW YORK
Cortland Brands
WICKWIRE IS WARWIRE
Life at sea does things to electric cable—and finely-drawn, tough, corrosion-resistant steel wire, woven in a special basket-weave pattern, protects cable, giving it strength and flexibility to "take it."
Supplying this wire is another duration job assigned to Wickwire Brothers, Inc., because of a peacetime reputation for making highest-quality wire.

a receptacle without attention from the operator. The unit weighs 150 pounds, Bearings are adjustable for wear and alignment.



A 40-PAGE catalog describing this and their benders and brakes for duplicating parts without dies is available upon request to the manufacturer.

Pittsburgh Regional Meeting

(Continued from Page 364)

many other suppliers of products necessary to the wire and steel industries who should be congratulated on their fine research developments and contributions to the war effort. Without these there isn't any doubt the tonnage would have fallen way short that required by the armed forces.

✦ ✦ ✦

"I NOTICE that in the last three or four years, there have been a number of papers presented before the Wire Association based on actual, practical experience, and I wonder if many of those who are interested in making and shaping of steel realize the untapped reservoir of the Wire Association and the possibilities of securing practical information from these papers in the Wire magazine that would be of help to them and also broaden out their experience.

✦ ✦ ✦

"JUST in recent months there have been some very fine examples of this kind. While a great many associations confine their articles to technical information, the Wire Association has not only supplied the technical data but a lot of practical examples as well.

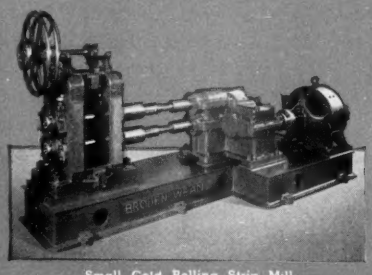
✦ ✦ ✦

"I DO not want you to think this is a membership campaign because it is not as our membership has reached the point it had been decided on some years ago; however, I do think that all of you have someone in your organization who you would like to see broaden out in experience and have training that would be helpful to them as in future years many of them will be needed for replacements in your organization."

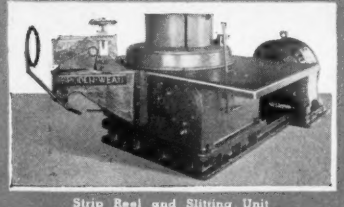
✦ ✦ ✦

THE speaker of the evening who followed Mr. Buchanan and who had been billed as a representative of the British Purchasing Commission, turned out to be a paid entertainer and humorist, and this feature of the meeting was said by those who heard him, to have been one of the cleverest and funniest things we have had at any of our meetings.

WEAN-BRODEN



Small Cold Rolling Strip Mill



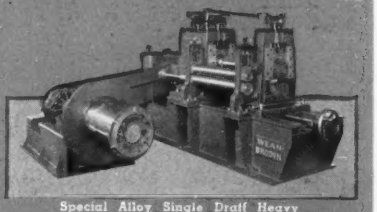
Strip Reel and Slitting Unit

THE Wean Engineering Company, Inc., have long been recognized as specialists in sheet, strip and tin mill equipment . . . The Broden Construction Company specializes in the manufacture of narrow strip and wire mill equipment.

With the extended facilities of The Broden Construction Company as a subsidiary of The Wean Engineering Company, Inc., it is now possible to serve the steel industry more effectively.

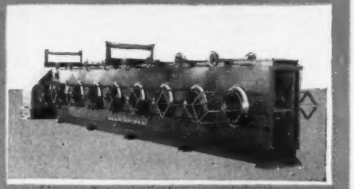
COLD ROLLING MACHINERY
For 36" Wide Material and Narrower
Mills • Reels • Slitters • Levelers • Coilers
Edgers • Scale Breakers • Shears
Scrap Ballers • Continuous Pickling

WIRE MILL EQUIPMENT
Wire Drawing Machines • Patenting
Galvanizing and Tinning Take-Up Frames
Wire Flattening • Spoolers • Nail
Galvanizing and Blueing



Special Alloy Single Draft Heavy Duty Vertical Wire Drawing Block for ⅝" Round Wire

HOLMQUIST BARBED WIRE and WIRE FENCE MACHINERY



The BRODEN CONSTRUCTION Co., Inc., Cleveland, O.
A SUBSIDIARY COMPANY OF
The WEAN ENGINEERING Co., Inc., Warren, O.

A Review of Recent Wire Patents

No. 2,345,675, MANUFACTURE OF MATTRESSES, patented April 4, 1944 by Harold Kibitz, Oak Park, Ill., assignor to J. W. Droll Company, Chicago, Ill., a corporation of Delaware.

The invention is in the quilted pad, supported by the wire coil springs and their border wire, and the way this pad is secured to the border wire.

✦ ✦ ✦

No. 2,345,686, SCREW AND SIMILAR MACHINE, patented April 4, 1944 by Charles A. Rich and William E. Twamley, Providence, R. I., assignors to Brown and Sharpe Manufacturing Company, a corporation of Rhode Island.

For fashioning screws from bar or like stock, the machines include a tool supporting and actuating mechanism arranged for effecting a series of single point turning operations upon a rotating work piece, which comprises a tool supporting turret, a tool slide shiftable axially of the work, and a turret support pivotally mounted on the slide for moving the turret transversely toward and award from the work, automatic means for actuating said slide and for indexing said turret and yielding means for feeding the turret support and turret toward the work for the performance in a continuous automatic cycle of a series of single point turning operations upon a work piece. There are 29 claims.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents; outside United States and Canada, $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

No. 2,345,864, CONDUCTOR CORE FOR WIRE ROPES AND METHOD OF MANUFACTURE, patented April 4, 1944 by James C. Arnold, Los Angeles, Calif., assignor to Lane-Wells Company, Los Angeles, Calif., a corporation of Delaware.

This core is said to be adapted for use with wire ropes subjected to extreme conditions of temperature and pressure. The reinforcing cords of the sheath cross each other and form a gridwork restraining flowing or creeping of the material (rubber-like synthetic material) of the sheath.

✦ ✦ ✦

No. 2,346,447, WIRE DRAWING BLOCK, patented April 11, 1944 by Weld Morgan, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a corporation of Massachusetts.

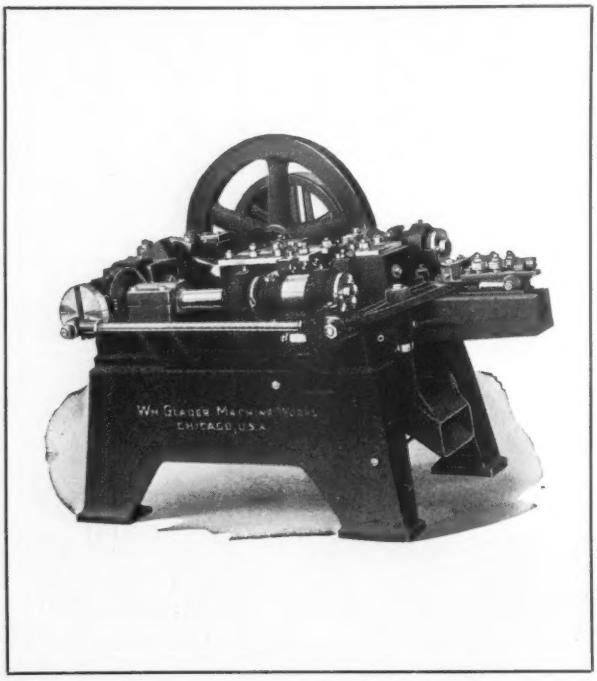
Included in this block is a central hub, an annular capstan portion surrounding the hub and spaced radially therefrom, means connecting the hub to the capstan portion, a series of thin ribs extending inwardly from the capstan portion and terminating a considerable distance short of the hub, the ribs being substantially parallel with the axis of the block and adapted to transfer heat from the capstan portion to a stream of air flowing through the block, and a separately formed baffle located in the space between the inner ends of the ribs and the hub to direct the air stream between the ribs.

✦ ✦ ✦

No. 2,346,523, PROCESS FOR IMPREGNATING CABLES, patented April 11, 1944 by Russel Swale Vincent, London, England, assignor to Callenders Cable and Construction Company, Limited, London, England, a British company.

The method includes continuously passing the cable between surfaces engaging the cable by dry friction in vacuum-sealing relationship into an evacuated space and out of the space through a liquid seal of impregnating composition, and subjecting the cable to preliminary heating before its entry into the evacuated space.

GLADER HIGH SPEED WIRE NAIL MACHINE



High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS

210 NO. RACINE AVE.
CHICAGO, ILLINOIS

No. 2,346,697, UNIVERSAL RECTANGULAR WIRE COATING DIE, patented April 18, 1944 by Robert W. Mungall, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York.

An expansible die is provided comprising a rigid frame having walls defining a substantially rectangular aperture, a movable die member slidably mounted in a recess provided in each of the walls with the ends of the die member extending into this aperture and cooperating to define an opening for the wire to be coated, two of these die members being oppositely disposed and substantially U-shaped with the ends of the arms thereof forming wire engaging surfaces, the remaining oppositely disposed die members being provided with wire engaging arms extending into the aperture formed by the arms of the U-shaped die members. There is also provided a device for biasing opposite die members towards each other.

✦ ✦ ✦

No. 2, 346,835, SCREW FASTENER, patented April 18, 1944 by Emmet M. Green, Los Angeles, Calif.

On the screw shank is a shoulder behind which the material displaced by the shank accumulates and which resists retroactive turning of the shank.

✦ ✦ ✦

No. 2,346,917, TAKE-OFF AND TENSIONING DEVICE FOR STRAND SUPPLIES, patented April 18, 1944 by Wilhelm A. Heger, Lansdowne, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

For this purpose, a device is provided comprising a slidable sheave around which the strand is drawn directly from the strand supply, and an elongated roller contacting the strand and coacting with the slidable sheave to cause the strand to advance under a uniform tension.

✦ ✦ ✦

No. 2,347,003, APPARATUS FOR APPLYING INSULATING TUBING ON WIRE CABLES, CONDUITS, AND THE LIKE, patented April 18, 1944 by Marshall O. Searle, Beverly Hills, Calif.

A guide tip is covered by this patent, for feeding a conduit through a tubular covering for the conduit and includes a tapering body, a longitudinal split stem on one end of the body, and a device carried by the body for expanding the stem into frictional engagement with the internal walls of one end of the conduit.

✦ ✦ ✦

No. 2,347,360, SELF-TAPPING SCREW, patented April 25, 1944 by Herman Gustave Muenchinger, South Foster, R. I., assignor to American Screw Company, Providence, R. I., a corporation of Rhode Island.

The free end of the screw shank is clipped to provide a surface at an acute angle to and intersecting the shank axis and a thread is rolled onto the shank after the shank is clipped. There are cutting extensions of the thread itself projecting beyond the surface in the direction of rotation of the screw.

✦ ✦ ✦

No. 2,347,448, BRIGHT COPPER PLATING, patented April 25, 1944 by

(Please turn to page 380)

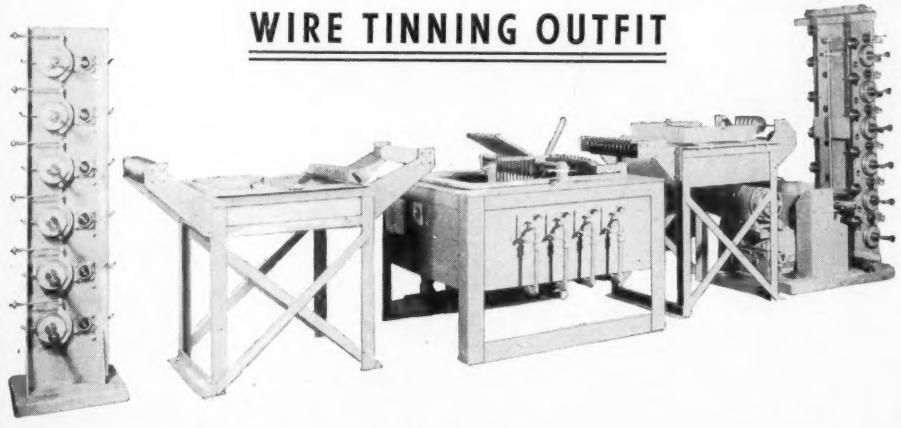
"Standard"
BEADING AND GROOVING MACHINE

Jumps production 200%

For precision beading, grooving and form rolling tubes through use of rolling mill principle. Grooves are developed by pressures accelerated rapidly by cam action on a form roll. Inside diameters at grooved section controlled by form roll. Hand controlled "draw-in chuck" provided for quick and simple loading.

Write for specific recommendations.

STANDARD MACHINERY CO.
PROVIDENCE 7, RHODE ISLAND

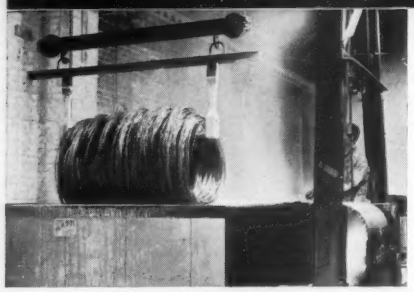


WIRE TINNING OUTFIT

Wire Machines For
Drawing, Enameling, Tinning, Spooling, Insulating with Glass, Asbestos, Paper Tape, Cotton, etc. Multiple Pull-outs, Rubber covered wire Panners, etc.

EST. 1855 AIMCo INC. 1913
"American" INSULATING MACHINERY COMPANY
517 West Huntingdon St.
Zone 33
PHILADELPHIA PENNSYLVANIA U.S.A.

MORRISON FLASH BAKERS



Save Time
Cut Costs
Speed Production

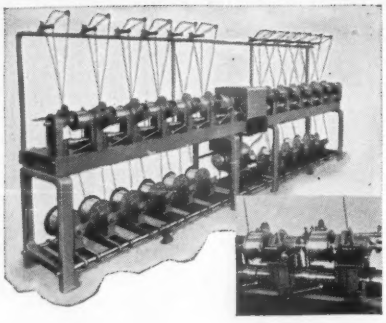
Fifty-three Morrison Flash Bakers now in operation in 29 plants are proving to wire manufacturers that their cost is an investment that pays dividends because of these operational features—

1—Space saving—size of a lime tank
2—Fit straight line or circle setups
3—Reduce cleaning house fog
4—Rust-free rod
5—High capacity
6—Acid brittleness recovery of about 95%
7—Rod remains on hook
8—Only a few minutes required for baking even fine wire

Descriptive Literature Sent on Request

MORRISON ENGINEERED
MORRISON ENGINEERING CORPORATION
5005 EUCLID AVENUE · · CLEVELAND, OHIO
Associate Companies: MORRISON ENGINEERING OF CANADA, LTD. TORONTO, ONTARIO — CARRIER ENGINEERING CO., LTD. LONDON, ENGLAND

For users of wire
another
FIDELITY
MACHINE
THAT MULTIPLIES
MANPOWER



Every winding head equipped with large-figure footage counters, conveniently located for inspection and control by operator.

This double-end, screw traverse FIDELITY Wire Spooling Machine is a high production unit. It winds wire at the rate of 600 to 700 feet per minute per spool.

On the 12-head machine illustrated, this totals about one and one-half miles per minute. Allowing time for changing spools, this makes possible the winding of 600 or more miles per 8-hour shift.—Accommodates spools up to 9¼" diameter. Adjustments for tension, flange variations and spool sizes. This same machine built in units handling 4-6-8-10 and 12 spools.

FIDELITY'S comprehensive line of wire winding and wire covering machines is described in a new 20-page catalog. Write for it.

ARMY E NAVY
Buy **BONDS** *to Bring the Boys Down the Home Stretch*

Intricate, Automatic Precision Machines
FIDELITY MACHINE COMPANY
3908-18 FRANKFORD AVENUE, PHILADELPHIA 24, PA.

A Review of Recent Wire Patents

(Continued from page 383)

Christian J. Wernlund, Niagara Falls, N. Y., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

This process comprising electrolyzing a solution containing 8 to 22 oz. per gallon of copper cyanide, 3 to 8 oz. per gallon of alkali metal hydroxide, 0.25 to 8 oz. per gallon of alkali metal sulfocyanide and an amount of alkali metal cyanide equivalent to a sodium cyanide to copper cyanide weight ratio of from 1:1 to 1.25:1, the alkali metal constituents of the solution being sodium and potassium present in the proportion of 1 to 6 moles of sodium ions for each mole of potassium ions.

✦ ✦ ✦

No. 2,347,449, REINFORCED CONCRETE STRUCTURE, patented April 25, 1944 by David H. Whitchill, Wichita Falls, Tex., assignor to Whitchill Engineering Company, Wichita Falls, Tex., a partnership.

A number of series of individual steel rings and provided, the center lines of the rings of the respective series being in spaced parallel relation, the rings of each series being in overlapping engagement and the rings of each series being in spaced overlapping relation to the rings of the adjacent series.

✦ ✦ ✦

Publishes Booklet on Reconversion

DEPARTING from their usual type of engineering bulletin, the **J. O. Ross Engineering Corporation**, 350 Madison Avenue, New York 17, New York, has issued a booklet on the subject of reconversion after the war.

✦ ✦ ✦

IN this they point out that no blue print can be devised that will fit all businesses, and that even businesses that have carried on through the war by making their regular line of products will face reconversion problems, insofar as new developments in industry, utilizing added plant facilities, and post-war conditions will affect them.

✦ ✦ ✦

THEY make no attempt to lay down a plan to be followed, but endeavor to supply the underlying principles that should be kept in mind by concerns who want to plan now to be ready to face the future peace period successfully. As such, the booklet is a valuable contribution to post-war planning ideas, and they will be glad to send it to anyone desiring a copy.

New Catalog Shows Extruders for Insulating

THE National Erie Company, Erie, Pa., has prepared a handsome new catalog which describes and illustrates their line of plastic and rubber extruding machines and accessory equipment. The book starts with a brief historical sketch of the development of extruding machines. showing pictures of earlier models, the first of which was made by them over forty years ago.

✦ ✦ ✦

THE complete line covers machines for making tubing, extruded plastic forms and extruders for insulated wire and cable, embodying several new features of design that are said to greatly improve operating efficiency and accuracy. These machines are made both as simple extruders and in models for continuous production. Also shown are their rubber mills, gates and other equipment concerned with rubber and plastic processing.

✦ ✦ ✦

ONE of the interesting machines illustrated is the continuous extruder developed by the Western Electric Company, which is now manufactured by them under a license arrangement with Western Electric.

✦ ✦ ✦

COPIES of this catalog are now available for distribution and will be sent to those interested in electric wire and cable manufacture with the compliments of the Company upon request.

THE WIRE ASSOCIATION
ANNUAL CONVENTION
will be held at the
WILLIAM PENN HOTEL
PITTSBURGH, PA.
October 16-19 Inclusive
For Detailed Information Address
RICHARD E. BROWN
Executive Secretary
THE WIRE ASSOCIATION
300 MAIN ST., STAMFORD, CONN.

APEX "SFV" PERFORMANCE DATA

(Case #18)

Type of Wire: Platinum and Palladium and Platinum-Iridium alloys.
Speed: 200 to 600 F.P.M.
No. of Dies: 21
Drawn: Wet
Dies: Diamond
Reduction per die: 15%
From: .020 to .001
Results: In comparison with several other previously tested compounds APEX "SFV" proved more efficient and economical to use.
Conclusion: We can duplicate in your mill the successful tests performed in many others. Please write.

APEX ALKALI PRODUCTS COMPANY
MAIN AND RECTOR STREETS
PHILADELPHIA 27 PENNSYLVANIA
BOSTON, MASS. PITTSBURGH, PA. ATLANTA, GEORGIA
MERIDEN, CONN. DETROIT, MICHIGAN LOS ANGELES, CALIF.

WILLEY'S DIES LAST MUCH LONGER
SIZING, EXTRUSION and WIRE DRAWING DIES

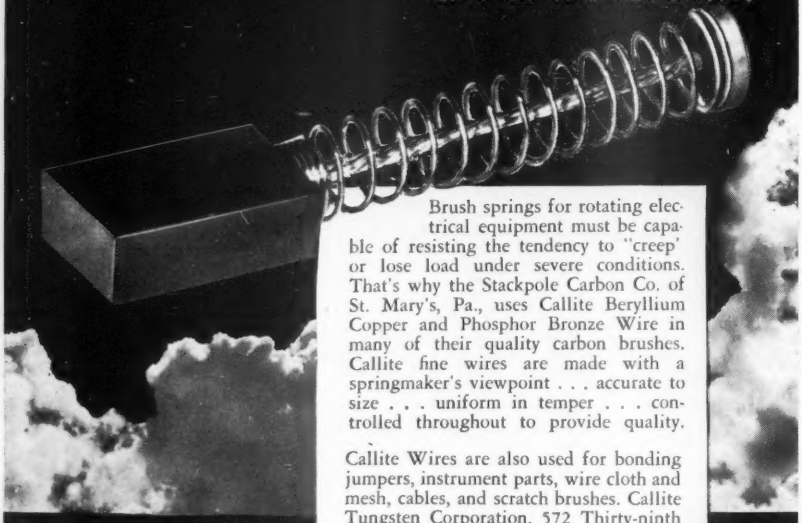
Manufactured in all sizes, to meet your requirements, from a specially developed grade of Tungsten Carbide having freedom from porosity, exceptional abrasion resistance and the ability to take a polish equal to that of diamonds. Furnished in four classifications, (1) blank and rough cored nibs, (2) rough cored dies, (cased), (3) semi-finished, rough drilled dies, (cased), (4) finished dies, ready to use.

WRITE FOR CATALOG

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

Callite Fine Wire

SPRINGS INTO ACTION....



Brush springs for rotating electrical equipment must be capable of resisting the tendency to "creep" or lose load under severe conditions. That's why the Stackpole Carbon Co. of St. Mary's, Pa., uses Callite Beryllium Copper and Phosphor Bronze Wire in many of their quality carbon brushes. Callite fine wires are made with a springmaker's viewpoint . . . accurate to size . . . uniform in temper . . . controlled throughout to provide quality.

Callite Wires are also used for bonding jumpers, instrument parts, wire cloth and mesh, cables, and scratch brushes. Callite Tungsten Corporation, 572 Thirty-ninth Street, Union City, New Jersey. Branch Offices: Chicago, Cleveland.

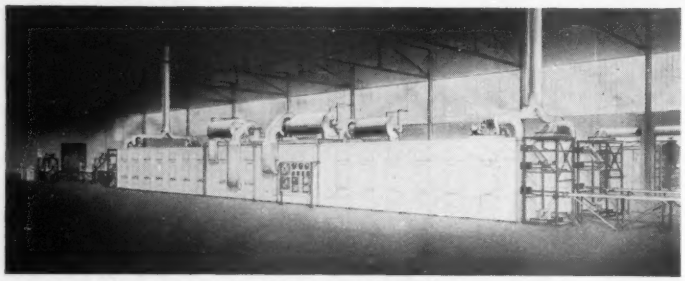
Callite Wire

Precision diameters down to .002" or smaller, drawn to optimum properties desired. Aluminum, Everdur, Beryllium Copper, Stainless Steel, Silver, Silicon Bronze, Brasses, "Clad" Wires, and Special Alloys. On spools, coils, or cut to your exact specifications.

MORE PRODUCTION IN LESS TIME *with* CARL-MAYER FURNACES, OVENS

CARL-MAYER HI-SPEED ROD BAKER

The fastest rod baker built! Saves up to 50% in time and fuel. Patented Blow-Off Feature removes moisture without bumping or agitating the coils. **Patented and patents pending.**



WELDING ROD OVEN

For drying coated welding rods. Uses the "Mayer" Recirculating Gas Fired Air Heater principle and Rod Transfer Systems (patents pending).

Growing interest in our type of equipment is evidenced by Carl-Mayer installations in such plants as:—

Atlantic Wire Co.
Atlas Steel Co.
Eaton Mfg. Co.
Hollup Corp.
Johnson & Nephew Ltd.
Page Steel & Wire Co.
Pittsburgh Tool Steel Wire Co.
Steel Co. of Canada
Wickwire Spencer Steel Co.

WRITE FOR BULLETIN #241

THE CARL-MAYER CORPORATION 3030 EUCLID AVENUE CLEVELAND, OHIO

Tissue Thin Transformer Steel Aids War Radio Development

TINY, tightly wound coils of paper-thin steel have a mighty big place in this war. In fact, according to **Westinghouse** engineers, without the development that led to super-thin transformer steels some of the radio-detecting devices of great military importance would not be possible, because insufficient power would be available.

✦ ✦ ✦

JUST a few months before the attack on Pearl Harbor, Westinghouse research and transformer engineers announced a new kind of cold-rolled silicon steel, called Hipersil, in which the grains are oriented or alined in one predominant direction. This grain orientation results in a much higher permeability at high transformer inductions. Also, with this steel it is possible to make transformer cores by an entirely new and much faster method. The old method utilized punched laminations laboriously stacked by hand. Now, ribbons of Hipersil are wound into a core shape that resembles a flatened roll of adding-machine tape. This steel and core construction had been used with great success in power and distribution transformers. In this role it increased greatly the output obtainable from a given amount of material.

✦ ✦ ✦

THEN came the war and with it the need for radio and communication sets — tens of thousands of them. Scores of new types were created by radio engineers. Some had to operate on 400 and 800 cycle power supplies while others utilized or delivered frequencies far higher than had been dreamed of a few years ago. Transformers losses and heating effects increase enormously as frequencies go up. To keep these within acceptable bounds the transformer-core laminations must become thinner. Conventional Hipersil cores before the war were 29 gauge — about fourteen mils (0.014 inch) thick. Rolling-mill, transformer, and metallurgical engineers immediately tackled and solved the problem of producing 7-mil Hipersil

cores to meet the new war demand. This permitted a reduction of one-third to one-half in the space and weight requirements for choke coils, reactors, and transformers. Weight and size are important indeed where radio sets carried by planes or men are involved But that achievement was still not enough. To obtain satisfactory outputs at extra high frequencies, the laminations had to be thinner — much more so. After much research and development work, engineers can now produce steel two mils thick. Entirely new rolling-mill techniques and annealing practices had to be developed. This ultra-thin transformer steel (half as thick as ordinary magazine paper) has made today's highly efficient apparatus possible. Cores are used which weigh from one-fifth of an ounce up to seven pounds. The technique of winding these cores from a continuous ribbon of steel (instead of thousands of flimsy L- or E-shaped punchings) not only made the applications possible but also saved thousands of war production man hours.

✦ ✦ ✦

Bulletin On Metal Stripping

THE American Chemical Paint Company, Ambler, Pa., in a new technical service data sheet describes in question and answer form the action of their ACP Metal Stripping Solution No. 2, which is used for the removal of copper, lead, zinc, cadmium and magnesium from base metals like steel, nickel, chromium and aluminum.

✦ ✦ ✦

BESIDES describing the solution and its action, information regarding equipment required and the various steps in the process from the preparation of the stripping bath to the final cleaning and drying of the metal, is included. If a copy of this Data Sheet is desired, please ask for No. 13-14-2-2.

Study our advertising pages. Buy from advertisers. They represent the Blue Book of sources of supply for the wire industry. Watch your step if you buy from a non-advertiser. He has no reputation to sustain.

Gilron

DRAW YOUR WIRE THE MODERN WAY with

GILRON COATING COMPOUNDS

A big step forward in wire drawing. Thoroughly proven in mill practice. Makes possible wire drawing speeds heretofore considered impracticable. Increases die life, prevents scratching of wire, produces better finish and eliminates use of lime in many cases.

These coating compounds are of particular value in the more difficult operations—stainless, alloy, high carbon and welding rod wire. Multiple reductions can be drawn without re-coating.

Coatings for Drawing Stainless, Alloy, Low and High Carbon and Copper Coated Wires

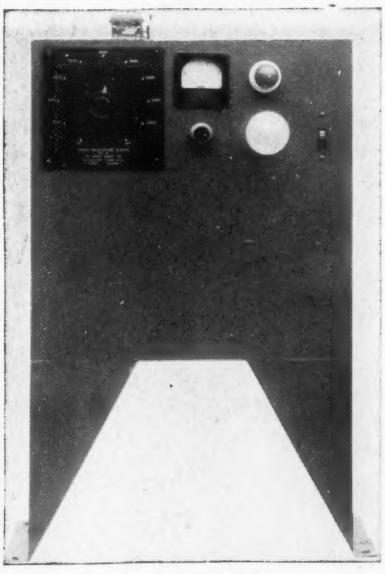
Let us confer with you. Write or telephone for particulars.

GILRON PRODUCTS COMPANY

1559 EAST 40th STREET • CLEVELAND, OHIO

Telephone HEnderson 8375

SPARKER for SYNTHETIC EXTRUSION COMPOUNDS



THIS APPARATUS WILL LOCATE DIELECTRIC FAULTS while the wire is being insulated. When breakdown occurs, the operator is notified by an audible alarm. A resettable counter gives the number of faults in each reel. By sorting out the defective reels in this operation, the majority of the resparking is eliminated. Continuous range of voltage at the electrode is from one thousand to sixteen thousand volts. The sparker is equipped with voltmeter reading in kilovolts, and automatic interlock with the takeup motor.

R. L. Davis Electric Co.

Wallingford, Conn.

NEW — AND BETTER

PATENTING
TEMPERING
ANNEALING

The Trauwood PROCESS

OUTSTANDING ADVANTAGES

Higher and more uniform physical and fatigue properties.

No surface decarburization or scale.

Faster wire speeds . . . greater production.

Equipment fully automatic and easy to operate.

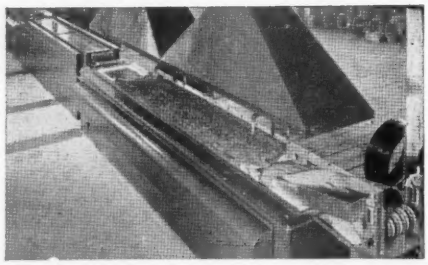
Control of heating and cooling cycles extremely accurate.

Thermal efficiency of the process very high.

Much finer grained structure possible.

High quenching temperatures rapidly attained.

Adaptable to high alloy and austenitic steel wire and strip (annealing of stainless).



Trauwood Electric Wire Tempering and Patenting Unit

The Trauwood Process, new in principle, eliminates high temperature furnaces and lead pots with their excessive maintenance costs and low thermal efficiencies. More positive temperature control is possible and quenching is done in a RISING temperature—instead of falling, as in conventional heat treating methods. The rapid rate of heating (4 to 5 times as fast as furnace heating) increases production and uniformly produces a finer grained product with higher physical and fatigue values.

Wire and rod patented by the Trauwood Process insures easier drafting and makes heavier reductions possible. In conjunction with the Trauwood patenting equipment, pickling, coating and baking can be made continuous, eliminating expensive handling and delay, materially reducing costs as compared with ordinary methods.

Complete details of the Trauwood Process will be furnished you on request. Our engineers will help you solve your continuous wire and strip patenting, tempering, and annealing problems. Write today.

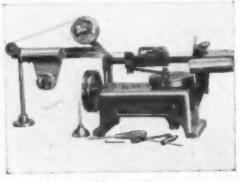
THE TRAUWOOD ENGINEERING COMPANY

1740 E. 23rd STREET, CLEVELAND, OHIO, U.S.A.

WIRE CUTTING & SHAPING MACHINES

For Wire From .0005" to 1/16" and Flat Stock up to 1/8"

No. 111



No. 4-E

Eisler fine wire cutting and forming machines have been in use over twenty-five years.

No. 111-H

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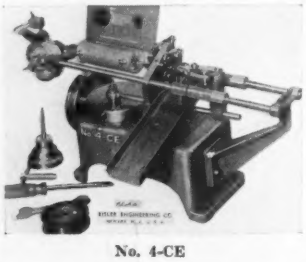

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WIRE SHAPES

Importance of Flexibility of Operation in Design of Welding Rod Oven

O. BYRON,
Ross Engineering Co., New York.

WITH the necessity for producing a variety of types and sizes of coated welding rods, the baking oven must be designed for maximum flexibility of operation. Ovens must be capable of handling any type of rod at maximum speed depending upon the type of coating and the time cycle.

✦ ✦ ✦

AN efficient oven design should permit producing up to 1200 rods per minute on a high production schedule or a few hundred rods per minute where lower production is desired, as in the case of alloy rods. Single pass continuous units and multi-pass type units are available today for practically any production schedule and space allowance. Not so long ago, a critical bottleneck in the production of welding rods for Navy operations was avoided through the use of a particular type of multiple pass oven.

✦ ✦ ✦

AN oven design that achieves this flexibility and speed at the expense of rod quality, however, must be guarded against. The quality of the rod coating is the chief consideration and the hardness and smoothness of the coating depends upon the exactness of the control maintained over heat, air circulation and humidity throughout the baking process. To insure such control, the oven design should provide, not only for speed variation but for zone baking, with separate controls for each zone.

✦ ✦ ✦

A COMMON cause of rod damage in a multiple pass oven is marking or gouging that may take place in carrying the rods from one conveyor pass to another. A properdly designed oven will embody a scientific arrangement that will protect the rods against such damage.

NEARLY 50% of the total welding rod production today is being secured in ovens incorporating all these essential features of design. That proportion will become steadily greater when more rod manufacturers begin to use more care in the selection of their baking rod ovens.

✦ ✦ ✦

Isothermal Quench Baths

HAROLD J. BABCOCK, Research Engineer for the Ajax Electric Co., Inc., Frankford at Delaware Avenue, Philadelphia, Pa., manufacturers of salt bath furnaces, recently prepared a paper treating this subject from a practical commercial production standpoint.

✦ ✦ ✦

IN this interesting and informative treatise he deals with the subject from the standpoint of the heat treater, the metallurgist and others concerned with the heat treatment of steel, calling attention to methods of securing proper physical properties by procedures that will bring out the desired characteristics required for the end-use of the metal.

✦ ✦ ✦

INCLUDED in the paper are a series of time-temperature transformation curves that can be invaluable aids in improving the physical properties of steel products based on several carbon and alloy steel studies. The heory and practice of the salt bath furnace for different types of work are examined, with a number of typical examples cited in the text and by illustrations and microstructure photographs. This excellent paper has been reprinted by the Ajax Electric Company, who will be glad to furnish copies to those interested. Please address Dept. W. in requesting a copy.

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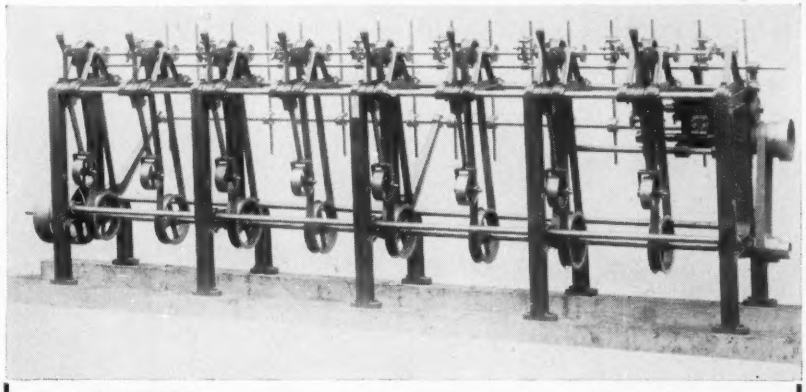

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New Lapping Machines Developed By Roos Co.

THE Roos Tool and Mfg. Co., of Montclair, N. J., has recently developed a light and heavy duty vertical straight lapping machine with short and long strokes for lapping bearings, drill jig bushings and small diameters from 050" to .375"

✦ ✦ ✦

THE Roos Co. makes light and heavy duty lapping machines for rough drilling and ripping work on dies, semi-automatic polishing machines with special oscillating tailstocks for finishing and polishing the inside of wire dies, ball bearing polishing lathes and spindles for hand polishing and finishing on carbide and diamond dies, special ten spindle drilling machines for drilling very small diameters in carbide and diamond dies, dry and wet grinders for grinding pins, diamond wheels, etc., and die sizing and shaping machines for finishing carbide dies for special, hexagonal and square dies.

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Standard Pickling Control

THE American Chemical Paint Co., recently published an illustrated technical service data folder on Rodine, a standard control for the pickling bath. The Rodine process revolutionized pickling of steel and has been responsible for saving vast quantities of metal since its introduction. For a copy, write to American Chemical Paint Co., Ambler, Pa.

✦ ✦ ✦

New Bulletin By Bristol Company

THE BRISTOL COMPANY, Waterbury 91, Conn., announces a new bulletin No. B220 describing its new line of Free-Vane Electronic Controllers for automatically controlling temperature, pressure, liquid level, and humidity. The bulletin gives wiring diagrams, principle of operation and general description and features of the new instruments. Copies may be obtained by writing The Bristol Company.

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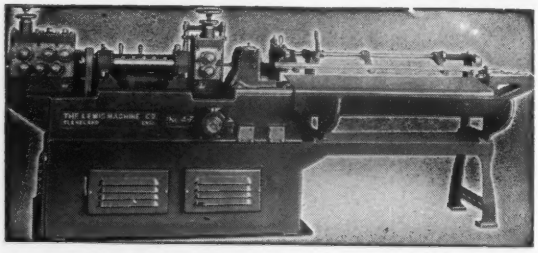

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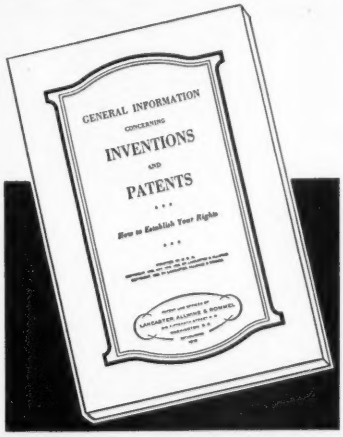

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New Plasticizer for Synthetic Insulation Materials

ANNOUNCEMENT of a new resin plasticizer, possessing high resistance to oils, gasoline and heat and already showing unusual promise in polyvinyl chloride cable compounds and cable lacquers, wire enamels, vinyl resin fabric coatings, hot-melt compositions, and aircraft gaskets and caulking and sealing compounds, marks a new step in chemistry's effort to perfect and enlarge the application of synthetic rubbers. Known as Paraplex G-25 and developed by the **Resinous Products & Chemical Company**, this synthetic resin is a saturated polyester, thermoplastic and chemically stable and can be used for all polyvinyl chloride resins and elastomers of the acrylonitrile butadiene type.

✦ ✦ ✦

THE resin is readily soluble in esters, ketones, aromatic hydrocarbons and chlorinated hydrocarbons. It is soluble in aromatic napthas such as Solvesso No. 2 but is insoluble in aliphatic hydrocarbons. Although the resin will not dissolve in alcohols, it will absorb up to 25% ethanol and 30% butanol. It is highly compatible with the vinyl chloride resins, synthetic rubbers of the Buna N type, cellulose nitrate, chlorinated rubber and certain thermosetting resins of the phenol formaldehyde type. Paraplex G-25 is also compatible with Buna S, neoprene, cellulose acetate propionate and polyvinyl butyral.

✦ ✦ ✦

PARAPLEX G-25 is supplied as a soft, tacky, viscous liquid which pours slowly at room temperature. It shows the following properties:

Specific Gravity	1.06
Acid number	3.0 (maximum)
Color	15 (maximum)
Odor	Faint, characteristic
Freezing Point	13-15° C.
Viscosity (50% in Ethylene Dichloride)	Q-V (Gardner-Holdt Scale)

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APEX "DRAW-ALLOY" PERFORMANCE DATA

(Case #52)

Type of Wire: Copper-nickel alloy.
Speed: 2200 ft./min.
Reduction: .025 to .0063.
No. of Dies: 12
Drawn: Wet
Dies: Diamond
Results: Production figures on the finishing die jumped from a two-numbered figure to several thousand, through the use of Apex "Draw-Alloy". Quoting the wire-mill supt. verbatim: "We are obtaining unheard of results with Apex 'Draw-Alloy'."
Conclusion: A test-run of Apex "Draw-Alloy" in your mill will prove its worth on *all* nickel-alloy wires. Please write.

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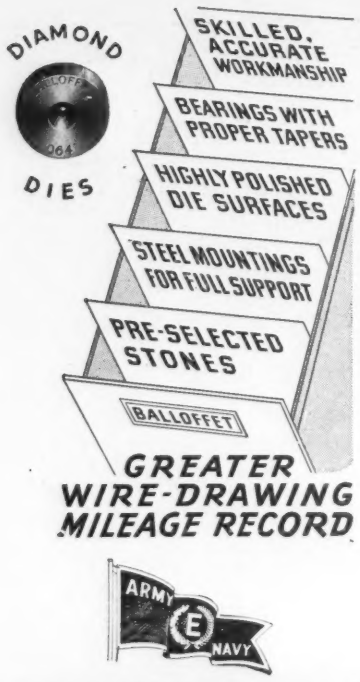

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Basicity Factors As Aids in Evaluating Limestones and Limes As Neutralizing Agents

By Richard D. Hoak, C. J. Lewis, and Willard W. Hodge

THE Multiple Industrial Fellowship sustained at Mellon Institute by the American Iron and Steel Institute has studied various factors important in the neutralization of waste acid liquors with limestone and lime, embracing particle size, relative reactivity, sludge settling rate, dilution pH, and temperature. A procedure is presented for determining basicity factors as a means for comparing the relative neutralizing values of limestones and of limes. This method should be useful in water, sewage, and industrial waste treatment plants.

✦ ✦ ✦

BASICITY factors are applied to the practical problem of neutralizing the waste liquor from the sulfuric acid pickling of steel. A procedure is given for the rapid (20 to 30 minutes) determination of the acid value of such a liquor, in terms of sulfate ion, with high precision and an accuracy of 0.2 per cent. A nomograph is presented from which the pounds of neutralizing agent per gallon of liquor can be read directly where the basicity factor of the agent and the acid value of the liquor have been determined.

✦ ✦ ✦

WHERE waste pickle liquor is neutralized with limestone or lime the settling rates of the sludges produced are generally similar to those of water suspensions of the neutralizing agents alone. Increments in temperature and dilution increase sludge settling rates but not sufficiently to justify their use economically. Such rates decrease with increases in pH, but are usually determined by the requirements of the neutralization.

✦ ✦ ✦

THERE is set forth a brief summary of the economic factors involved in deciding whether to use limestone, quicklime, or hydrated lime.

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PAUL GRODZINSKI

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The use of diamonds and gem stones as dies for fine wire drawing, and of diamonds for cutting tools, is comparatively recent. Today it is extensive and increasing. In this book the author has brought together all the data and information available on the subject and has added the results of his own experience and research. Although dealing mainly with the actual production of the dies and tools, the knowledge this book imparts is of prime importance to tool users. Efficiency and economy in the use of diamond and gem stone dies and tools is not possible without a knowledge of production methods.

✦ ✦ ✦

There are reference tables and a large number of specially drawn illustrations included in this book. An endeavor has been made to leave no phase of the subject untouched.

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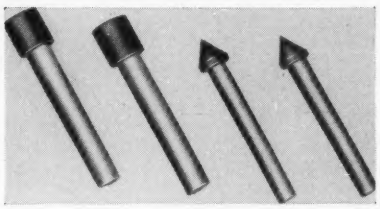
Brings Out New Line of Burrs and Wheels

THE Champion Diamond Co., 551 Fifth Avenue, New York City, has developed a new line of tungsten diamond impregnated burrs and wheels. They are suitable for use on all tungsten steel dies, where ordinary burrs will



not work, and are said to be useful in fast deburring, for precision surfacing and for smooth final finishing. They come in sizes from ⅛″ to 1″ diameter. Literature describing these burrs and their other diamond tools may be had upon request.

✦ ✦ ✦

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✦ ✦ ✦

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Copper in Galvanizing Zincs and Galvanizing Baths

(Continued from Page 357)

the copper content of galvanizing baths is as follows—

(1) A very small amount of copper, not over 0.25 of 1% do not from a practical standpoint seem to have a harmful effect on zinc coatings.

(2) A metallic content of any of the common impurities found in zincs and in the galvanizing bath, do not appear to be harmful when they exist in very small quantities.

(3) A distinct harmful, and in many cases actual disasterous effect has been encountered when these same impurities get into a galvanizing bath in large quantities.

(4) An impurity in a small amount that is distinctly beneficial in one field of galvanizing, may be distinctly harmful when it exists in the same amount in another field of galvanizing where the use service is entirely different.

(5) A very small amount of copper in the galvanizing bath would appear to be distinctly beneficial to corrosion resistance, when that amount is 0.25 of 1%, or under.

(6) There does not seem to be any outward effect on the appearance of the spangle, or the color of the zinc coating when this small addition, or amount of copper is in the galvanizing bath.

(7) The theory advanced for the beneficial results of small copper additions, and content of a zinc coating is that a zinc-copper top layer of the coating, is more resistant to corrosion than a pure zinc layer.

✦ ✦ ✦

Rod and Wire Coatings in the Cleaning House

(Continued from Page 361)

2. Have a composite melting point which will penetrate the coating to the metal surface, but which will not allow the lubricant to liquify and burn up.
3. A high film strength without loss of elasticity which is needed so that the lubricant can stretch with the wire and still completely cover.
4. Good solubility in acids or alkalies for complete removal after drawing.
5. Non-tacky and dry after the pressure and heat of drawing.
6. Correct particle size in grinding so there is not too much lubricant drawn into the ripper die which causes packing and back feed, nor too little drawn into the die for proper film coverage and extension.

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2—Shuster Shaped Wire S. & C. Machines ½" & ⅞" Square, Hexagon & Round Stock Capacities
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✦ ✦ ✦

THE motor is of high-starting torque, reversible type with bearings sealed in grease for lifetime.

✦ ✦ ✦

THE unit operates on 3 phase 50 cycle, 220 or 440 volts, and is shipped complete, ready to install as specified. "Handi-Lift" bulletin No. H-23, giving specifications, is available on request.

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WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Directory, Index & Buyers' Guide.

ABRASIVES—
Norton Co., Worcester, Mass.

ACID INHIBITORS—
American Chemical Paint Co., Ambler, Pa.

ACID-PROOF CONSTRUCTION—
Ceilcote Co., The, Cleveland, Ohio
Haveg Corp., Newark, Del.
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Co., Buffalo, N. Y.

AIR DRAW FURNACES—
Carl-Mayer Corp., The, Cleveland, Ohio.

ALKALINE CLEANERS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

ANNEALING MACHINES—Open Flame
Synero Machine Co., Rahway, N. J.

ANNEALING POTS AND BOXES—
National Annealing Box Co., Washington, Penna.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Synero Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

BAKERS—Flash
Morrison Engr. Corp., Cleveland, Ohio

BAKERS—Hi-Speed
Carl-Mayer Corp., The, Cleveland, Ohio.

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Morrison Engr. Corp., Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

BENDERS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

BOBBINS—Braider and Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRAKES & SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

BRICKS—Acid Proof
Keagler Brick Co., Steubenville, Ohio.

CABLE LACQUERING OVENS
Industrial Oven Engr. Co., Cleveland, Ohio.

CABLE—Steel and Copper
Brewer Mfg. Co., Muncy, Pa.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.

CASTINGS—Wire Mill
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

CEMENTS—Acid Proof
Ceilcote Co., The, Cleveland, Ohio.
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Co., Buffalo, N. Y.
Sauereisen Cement Co., Pittsburgh, Pa.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANERS—Hand and Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANING & PICKLING EQUIPMENT—
Broden Construction Co., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Haveg Corporation, Newark, Del.
Morgan Construction Co., Worcester, Mass.
Nukem Products Corp., Buffalo, N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

CLOTH TESTERS—
Scott, Henry L., Co., Providence, R. I.

CLOTH—Wire, All Metals
Callite Tungsten Corp., Union City, N. J.
Roebling's, John A., Sons Co., Trenton, N. J.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Gilron Products Co., Cleveland, Ohio
Magnus Chemical Co., Garwood, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

COLD HEADERS—
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Gilron Products Co., Cleveland, Ohio.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Shell Oil Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Everett, Mass.

DIAMONDS—Industrial
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Callite Tungsten Corp., Union City, N. J.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Wks., New York, N. Y.

DIAMOND POWDERS—
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIES—Eyelet
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Co., Union City, N. J.
Willey's Carbide Tool Co., Detroit, Mich.
Wopis Industry Laboratory, Brooklyn, N. Y.

DIE MAKING MACHINERY — For Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Lead Extrusion
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies Co., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.
Wopis Industry Laboratory, Brooklyn, N. Y.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.
Wopis Industry Laboratory, Brooklyn, N. Y.

DIRECT ELECTRIC RESISTANCE HEATING—
Trauwood Engr. Company, Cleveland, Ohio

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Stevens Metal Products Co., Niles, O.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING AND PRE-HEATING ROOMS—
Industrial Oven Engr. Co., Cleveland, O.

DRYING EQUIPMENT—
Ross, J. O., Engr. Corp., New York, N. Y.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FLASH BAKER—
Morrison Engr. Corp., Cleveland, Ohio

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

FRICTION PAY-OFF STANDS—
Industrial Oven Engr. Co., Cleveland, O.

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Trauwood Engr. Company, Cleveland, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

WHERE TO BUY, Continued

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Brazing
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Pennsylvania Ind. Engrs., Pittsburgh Pa.
Rockwell, W. S., Co., New York, N. Y.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Electric
Electric Furnace Co., Salem, Ohio
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engr. Co., Cleveland, Ohio

FURNACES—Hardening & Tempering
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Robertson, John, Co., Brooklyn, N. Y.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Ind. Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING EQUIPMENT—
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
Anex Alkali Products Co., Philadelphia, Pa.

INSULATION LACQUERING SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, O.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry & Machine Co., Waterbury, Conn.

LIME—
Warner Co., Bellefonte, Pa.

LININGS—Acid and Alkali Proof
Ceilcote Co., The, Cleveland, Ohio

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Shell Oil Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Shell Oil Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Syncro Machine Co., Rahway, N. J.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, Ohio
Eisler Engineering Co., Newark, N. J.
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Nilson, A. H., Mach Co., Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
American Insulating Machy. Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Machy. Co., Philadelphia, Pa.
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery Inc., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.

MACHINERY — Die Making for Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Draw Benches
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging
Broden Construction Co., Cleveland, Ohio.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Galvanizing
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Hydraulic Test
Riehle Testing Machine Div. of American Machine and Metals, Inc., East Moline, Ill.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.

WHERE TO BUY, Continued

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY — Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Brockton, Mass.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Broden Construction Co., Cleveland, Ohio.
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Shaping
Eisler Engineering Co., Newark, N. J.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Mach. Co., Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Davis, R. L., Elec. Co., Wallingford, Conn.
Riehle Testing Machine Div. of American Machine & Metals, Inc., E. Moline, Ill.
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., The, Cleveland, O.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up (Constant Tension, Variable Speed)
Industrial Oven Engr. Co., Cleveland, O.

MACHINERY—Wire Bending
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Eisler Engr. Co., Newark, N. J.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Weaving
Broden Construction Co., The, Cleveland, O.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., The, Cleveland, O.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Shell Oil Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Cable Lacquering
Industrial Oven Engr. Co., Cleveland, Ohio

OVENS—Dehydrogenizing
Industrial Oven Engr. Co., Cleveland, O.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Oven Engr. Co., Cleveland, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

OVENS—Welding Rod Coating
Industrial Oven Engr. Co., Cleveland, O.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

PICKLING TANK LININGS—
Ceilcote Co., The, Cleveland, O.
Keagler Brick Co., Steubenville, Ohio.
Sauereisen Cement Co., Pittsburgh, Pa.

PIPES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lacquer
Industrial Oven Engr. Co., Cleveland, O.

POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

WHERE TO BUY, Continued

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Spencer Steel Co., New York, N. Y.

ROLL STRAIGHTENERS—
Moslo Machinery Co., Cleveland, Ohio

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Brewer Mfg. Co., Muncy, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

SATURATION SYSTEMS—
Industrial Oven Engr. Co., Cleveland, O.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Oven Engr. Co., Cleveland, O.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRAND—Steel and Copper
Brewer Mfg. Co., Muncy, Pa.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANK LININGS—Brick
Ceilcote Co., The, Cleveland, O.
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Corp., Buffalo, N. Y.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Haveg Corp., Newark, Del.
Nukem Products Corp., Buffalo, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Davis, R. L. Electric Co., Wallingford, Conn.
Riehle Testing Machine Div. of American Machine and Metals, Inc., East Moline, Ill.
Scott, Henry L., Co., Providence, R. I.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio

WIND-UP AND UNWIND SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, O.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE—Enameled for Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Flat
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Bros., Inc., Cortland, N. Y.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE—Music
Jersey Steel & Wire Corp., Irvington, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.

WIRE—Non-Ferrous to Specification for Special Purposes
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Stainless Steel
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., New York, N. Y.

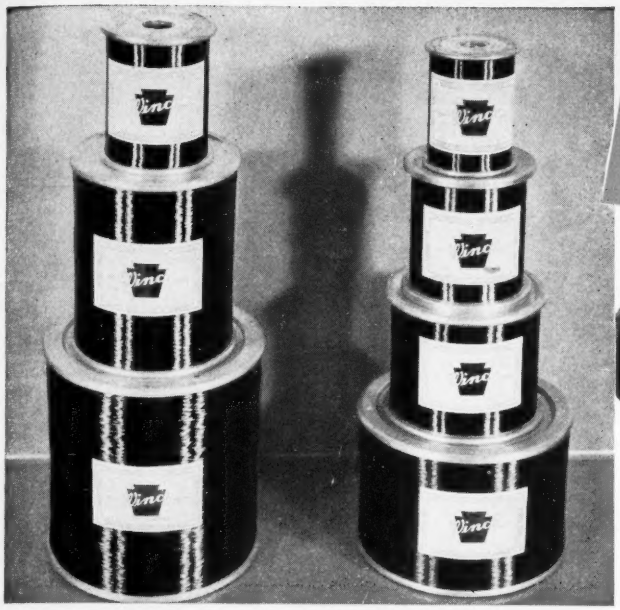
WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.



Custom built spools for high speed winding

Mercury testing for continuity of film

Checking raw materials

Don't "fool around"... USE DEPENDABLE WIRE PRODUCTS!

A product, too, is only as strong as its weakest part. Follow the practice of leading designers and engineers by specifying only service-giving wire . . . wire that has built up a reputation for "delivering the goods under fire."

Hudson Wire products, designed for discriminating manufacturers, has just such a reputation in the fine wire field. Offering greater flexibility and tensile strength, perfect laying at higher speeds, new coating methods and reduced coil dimensions without sacrificing electrical values, Hudson Wire products will probably lower your production costs considerably. Check these three points:

QUALITY— All phases of manufacture, from ingot to final processing, are carefully supervised and fulfilled in the same manner you would carry out in your own plant. There are no unimportant phases in the work.

UNIFORMITY — By mercury process tests, our engineers can guarantee perfect uniformity in wire; from the smallest to the largest order. No more variations in consistency, structure or electrical properties . . . every inch of wire exactly as specified, more than meeting your requirements.

SERVICE—If you have a wire problem, our complete design and engineering facilities are at your disposal without obligation. Send your specifications and blueprints for our recommendations; or if you are not quite ready, write for samples of these quality products.

Enameled Copper, Enameled Iron, Enameled Alloy, Enameled Aluminum, Silk Covered, Cotton Covered, Celanese Covered, Glass Fibre Covered, Twisted Multiples, Parallel Multiples and Litzendraht.

HUDSON WIRE CO.

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WINSTED CONNECTICUT

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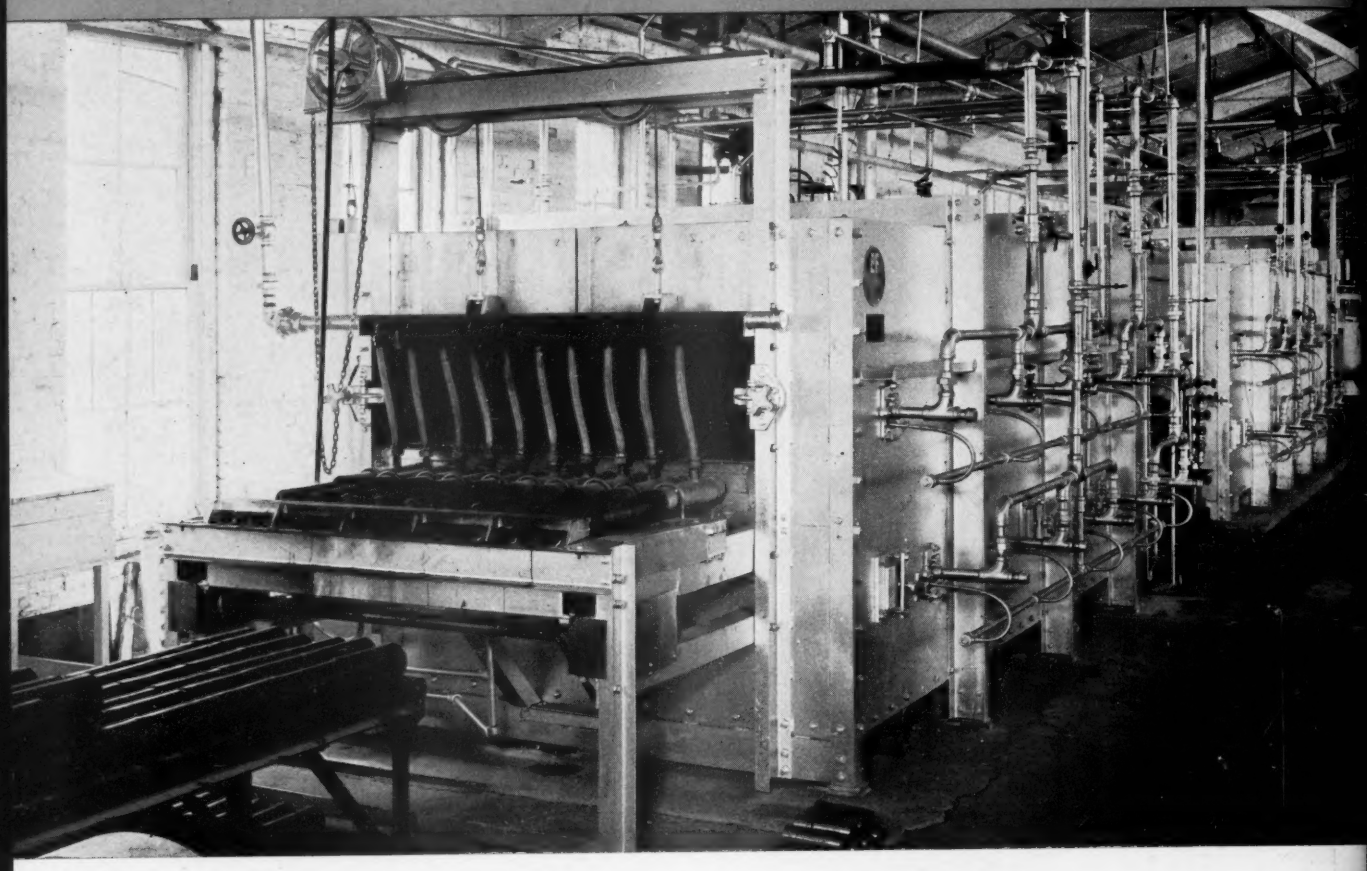
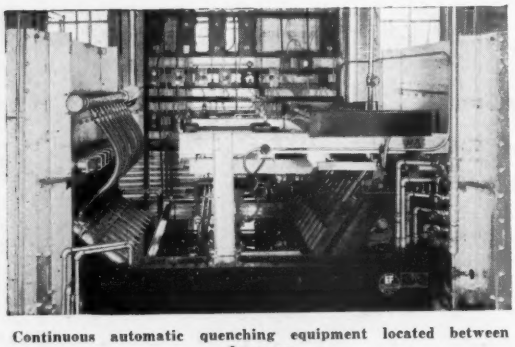
For Every Industrial Heat Treating Process



This EF Automatic Gas Fired Furnace Installation

Heat Treats Shells—Scale-Free



Continuous automatic quenching equipment located between furnaces

The shell forgings are pushed through the hardening and tempering furnaces in parallel rows, in protective atmosphere-filled conveying tubes. An automatic quenching equipment (shown at left) is located between the furnaces. The shells are quenched without coming in contact with air, automatically reversed and charged into the tempering furnace.

This installation is gas-fired and is equipped with ten conveying tubes. Similar installations with 15 conveying tubes are also in operation.

This is one of a number of outstanding production furnace installations we have made for heat treating various sizes of shells and other products such as tank armor castings, machine gun cartridge clips, cartridge cases, aircraft and aircraft engine parts, bomb, gun and ammunition components, and other allied products.

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The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production

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